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Bob Cooper's

FEBRUARY 15 2004

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Reporting on "The World" of satellite television in the Pacific and Asia

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This publication is dedicated to the premise that as we are beginning the 21st century, ancient 20th century notions concerning borders and boundaries no longer define a person's horizon. In the air, all around you, are microwave signals carrying messages of entertainment, information and education. These messages are available to anyone willing to install the appropriate receiving equipment and, where applicable, pay a monthly or annual fee to receive the content of these messages in the privacy of their own home. Welcome to the 21st century - a world without borders, a world without boundaries.

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our **TENTH** year!

COOP'S COMMENT

February 15, 2004

Piracy. A major hit from Foxtel and Austar late in January behoves me to remind readers that the history of grey market decoding is a form of scripture for those who mistakenly believe they can "beat the system." At best, their "victory" is temporary and I very much doubt it is financially attractive as many believe it to be.

Back seven years ago, shortly after Palapa C2 became operational, a number of forbidden movie and special channels were suddenly available for Asia with signal spill over into Australia. Included was a sporting channel (ESPN based) and one - then two - movie channels; HBO (Home Box Office) and "Cinemax Asia" which was then a derivative of HBO. The encryption system was B-MAC, analogue, and required both a Scientific Atlanta CDE-2000 B-Mac decoder and a smart card. The primary source for this package of receiver + card was Indonesia and just south of Indonesia a number of folks in Australia's NT became "agents" for CDE-2000 packages. Typically, the price was in the region of A$2,000 for a receiver and card. But the Indonesians from whom the NT folks sourced the packages were clever folks - they "sold" one year packages including receivers but paid for the cards month to month. After a few months, the Indonesian based "subscriber" decided whoever had the receiver now could be asked for another card payment and they enforced this request by neglecting to pay the current month's subscription. After days/weeks of hassles through bad telephone connections and angry verbal exchanges, the hapless Australian with the receiver and non-functioning card usually caved in and paid another A$1,000 to continue his access to the then four channel package. When the original 12 month period expired, the real fun began - now the Indonesian entrepreneur wanted another A$2,000 for something he was buying for around A$500 - a $1,500 profit for doing nothing more than signing up for a pay-satellite service. A$1,500 was big bucks to an Indonesian fisherman and he did not need many of these Australian suckers to "earn" more than his fishing was providing. Many Indonesians lived very well for the few years this scam lasted. It ended, by the way, when analogue B-Mac was shut off.

HBO + Cinemax + sports was "forbidden fruit" in those days - Galaxy (Australian's pioneer satellite service) was not yet into NT or WA (or New Caledonia) so even at $83.33 or A$166.66 per month, the charges were acceptable (if totally unreasonable by today's standards). Then along came Foxtel + Austar as replacements for Galaxy and the game changed. When Galaxy cards were "violated" by Mad Max from South Africa, all of the old rules disappeared. Now, for less than A$100, it was possible if you owned a receiver capable of processing Irdeto-1 encryption to have complete access to the full programming package. Grey market (MOSC or modified original smart cards) proliferated, replaced by do-it-yourself "gold cards" sold at the local pub and seemingly Irdeto 1 was dead as a secure CA system.

And so more than 30,000 Irdeto-1 compatible receivers were sold (ostensibly for Aurora), each when equipped with a gold card or equivalent (such as the plug-in "Fun Cards") was seemingly immune to the counter measures mounted by Foxtel and Austar. *Until late January.* As our report starting on page 19 here relates, the gold card era is winding down - perhaps totally by March. Foxtel and Austar is simply shutting off the entire Irdeto 1 data stream. Gold cards, and their derivatives, simply refuse to work with Irdeto 2, NDS or any of the more modern CA streams.

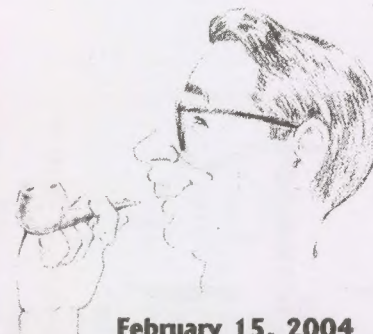
Now, adding to the pile of ex-useful Scientific Atlanta DVE-2000 analogue receivers, we now have perhaps 30,000 receivers which until very recently when married to a Gold Card provided grey market access to "the forbidden fruit" of pay-TV. So what will replace the Gold Cards? The answer is unclear but as long as people believe they can access pay-TV without paying a monthly fee to Rupert Murdoch or his wanna-be clones, there will be those who attempt the task. The latest "Gee-Whiz - look at my free pay-TV reception" device is built around a German designed IRD called the Dreambox (SF#107, p. 12). How it works - when it works - and the price is described in some detail in this issue; p. 21.

A Dreambox is an expensive toy. Alone, without some sophisticated computer connection circuitry, it is simply another high-tech-toy with appeal limited to the computer savvy satellite enthusiast. With the extras added, it begins to become a tool to tap into pay-TV without paying the normal monthly fee. But how long will it last? At what point does a Dreambox become a Scientific-Atlanta DVE-2000 totally useless piece of hardware? Does it really make economic sense to invest Australian $750 in a box that may provide a limited amount of "free pay TV access" when the box might be made redundant oveenight just as Palapa B-Mac and Irdeto 1 shut down without warning? In the "war" between programmers and pirates, the programmers just won a big one. When is it simply more sensible to *subscribe* to Foxtel? That's the big question.

In Volume 10 ◆ Number 114

Departments

-On the cover-

Hammer down. Foxtel and Austar have moved to shut down the "Irdeto 1" loophole. Thousands of grey-market cards have gone down and the indications are this is but the start of a major offensive against piracy in Australia. See page 19.

LETTERS

Belden cable?

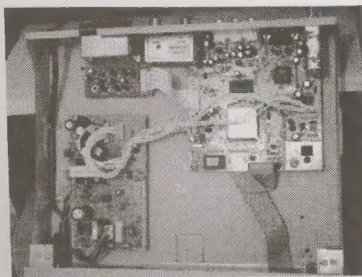
"Interesting analysis of various RG6 cable formats (SF#113, p. 6). Garry Cratt illustrates 'industry standard' with a photo of a wooden reel of Belden cable. The TFC guys tell me they suspect the Belden cable is actually manufactured in China and then finished in USA - such as being wound on wooden reels. Check Belden's boxes - they no longer proudly proclaim, 'Made in USA!' We import a great deal of coaxial cable from China and am pleased to say that the quality is generally very good and getting better all of the time. Yes, sometimes we find a drum or two with a problem but that is rare and the pricing is so much better than even Belden that we can't look past it. The real problem is the fellow who 'knows someone' and fills his garage with a shipment of lower grade coaxial cable that he does not understand and has bought (to resell) based solely upon price. Our's is branded 'Aerial Industries' and we guarantee it for performance and price."

Peter Lacey, Laceys.tv

Garry Cratt's main points were as follows: (1) Cable that is "Swept" and "guaranteed to 1,000 MHz (1 GHz)" is suspect when you can purchase a similar roll/reel that has been "swept and guaranteed to 2,000 MHz." Sources that do not "sweep test" their cable, and provide no guarantee of maximum operating frequency (whether 1,000 or 2,000 MHz) should be avoided totally. And, (2), cable shielding integrity is crucial to protecting the signals carried inside the "pipe" from being polluted by signals that are in the air outside the pipe. The integrity of the shield directly relates to the maximum useful frequency (whether 1,000, 2,000 or some other number) and a dual-shield (two layer) RG6 product is seldom if ever as effective in preventing signal penetration from outside the cable as a quad (4 layer) shield. Caveat Emptor: *Buyer beware.*

PowTek versus Innovia

"The PowTek Jason at aDigitaLife sells is the same as the Innovia. In fact, checking the Powtek's software reveals Innovia software and even reports it as Innovia. The front panel differs but the remote is the same - see www.adigitalife.com.au/products/org_82.jpg."

C. Sutton, NZ

End of trail; see Innovia interior p. 18, SF#112.

PROGRAMMER PROGRAMMING PROMOTION UPDATE

FEBRUARY 15, 2004

Are these people real? This is a transcript of a call one of our readers received from Foxtel. Not one word has been modified!

Fxtel: "Hi, have you heard Foxtel will soon commence its digital rollout?

Me: "Yes, I already have Foxtel in digital."

Fxtel: "Nobody has it yet."

Me: "Well I do."

Fxtel: You're kidding, right?"

Me: "No, I have satellite and I understand the signal has been digital since it started under Galaxy late in the last century."

Fxtel: "Is that so?"

Me: "Yep."

Fxtel: "Anyhow, the new digital service starts soon. Have you seen the flyer that came with your Feb Foxtel magazine?"

Me: "Yes."

Fxtel: "It's exciting, isn't it?"

Me: "Maybe."

Fxtel: "Do you intend to subscribe?"

Me: "Not till I know the cost. Actually, I'm thinking of disconnecting Foxtel completely."

Fxtel: "Ohh, please don't do that. There's very exciting things heading your way (*my first name - Foxtel rep starting to get matey here*).

Me: "Well, we'll see."

Fxtel: "Would you like to be one of the first people in (*name of my suburb*) to get Foxtel digital?"

Me: "We've already been through this. Already got it. Yes, I was one of the first when you guys drove Galaxy broke."

Fxtel: "OK, right, I take your point. Well, would you like to sign up to the new service as soon as we release it?

Me: "Dunno. What's the price?"

Fxtel: "We haven't released that yet."

Me: "Is there a point in continuing this discussion?"

Fxtel: "Absolutely! Our crew will be in your area to convert you and to install the return path very soon."

Me: "When?"

Fxtel: "We haven't released that information yet."

Me: "It's pointless trying to sign me up unless I know what the cost will be and when the upgrade will be performed. By the way, what's this return path thing?"

Fxtel: "We plug the box into your phone line so that you can do cool interactive things."

Me: "So my phone bill will increase?"

Fxtel: "We haven't released info about that yet."

Me: "Is it compulsory to upgrade?"

Fxtel: "Not initially."

Me: "Well, I gotta go. I guess you will be harassing me again when your plans are more concrete."

Fxtel: "We don't like to see any of our customers pass up such a compelling opportunity."

Me: "I'm sure you don't! See ya!!!"

C1, B3 transponder loading update begins page 29, this issue.

Back into your tiny boxes please

"My telephone is ringing off the hook with irate calls from folks who have purchased the Aurora service package here in Tasmania. A letter without a date but received the last week in January advises, 'access will be restricted to your own state broadcasts of ABC Local Radio and Radio National' starting 2 February. They claim 'the ABC is obliged by law to restrict cross -border transmissions' and that while this ruling affects only radio, '(future) restrictions to (ABC) TV programs will be temporary and will be in place for the duration of (a) court case only.' When 'Sixty Minutes' covered a mass murder case here in Tasmania, what we saw on our local ABC outlet for an hour was a test card. Have these people never heard of Internet, newspapers, magazines, multi-state AM radio that efficiently cross over 'state boundaries'? What is the rationale behind shutting off '60 minutes' when the full text of the entire show is available on Internet? And excerpts appear on non-ABC radio broadcasts? First we create a national, bring-the-nation-together television and radio satellite service and then when it works, they tell us all to go back to our 'tiny boxes' and be content with only the local news. What a rotten decision!"

Brian Watson, Tasmania

A nearly-full version of the ABC letter appears on p. 21 of this issue. The courts believe that making high-profile in-depth news stories available in a local area has the potential to 'pollute the juror pool' by giving them information which might somehow affect their objectivity to serve on a jury. That the same potential jurors have access to dozens of other non-ABC sources seems to have escaped their attention. The answer is to use an Irdeto-One cloned Aurora card which is beyond EMM/ECM intervention to shut down non-in-state ABC radio services.

NHK/DW on TVNZ Mux?

"I would much rather see them assemble something that is from NZ, not merely a 'relay' of another country's national or international service. If TVNZ, as reported in SatFACTS, is striving for a '20,000 receiver universe' for their MUX, they had better look closer to home for programming and quit trying to interest foreign broadcasters in a relay service."

RU, New Zealand

The bean counters have exerted their influence here - "find us a client or two who will help defray the annual cost of this 1/2 of a B1 transponder." Maybe the programming guys need to take a look at this - sourcing TVNZ copyright owned material from their archives, putting it in a schedule on the MUX ("TVNZ Yesteryear"?), and then authorising (with suitable payment) the UHF regional outlets to tap in and use it for local TV broadcasting.

Another Humax bites the bullet

"The power supply in my Humax 5400 has quit. What do I do next?"

Alain Vert, Australia

Contact Garry Cratt (cgarry@avcomm.com.au) and he will arrange a replacement power supply.

HARDWARE EQUIPMENT PARTS UPDATE

FEBRUARY 15, 2004

Irdeto-One may be dying in Australia but the next level replacement is coming on fast. As many as 25 users owning Dreambox IRDs now routinely share a *single* (programmer original) smartcard with ethernet/LAN/WiFi/dial-up Internet as the link. Confused? It's the next evolution in pay-TV without paying - although it turns out to be more of a 'communal' project than a risk-taking money grubbing pub-selling grey market card activity. It helps to be a "computer nerd" and having an empty can of Pringles (chips) around gives you a leg up (http://www.netscum.com/~clapp/wireless.html). Start on p. 19.

Reason #47 why people sent new Austar cards have not made the changeout - yet. There has been a vigorous business in "personal cloning" - take the one original card in your lounge TV IRD and duping it- *once*, for a new Humax (or whatever) which goes into the bedroom. Cheaper than paying A$25 a month for the real thing? Maybe. But if they turn in the original, which will be turned off, there goes the bedroom clone as well.

SatWorld's new display centre home. A new company purchased facility (*"in this for the long run..."*) has been opened to serve the greater Victoria market. The firm represents Nokia, eMTech, Humax, Topfield, UEC and Strong receivers as well as being the Victoria distributor for the suddenly interesting Dreambox (p. 19). Operating antennas from 65cm to 2.3m are connected to a variety of receivers allowing consumers/installers to "sample" more than 1 dozen C and Ku band satellites. Their business hours are Mon-Fri 8.30AM-5pm at 2/493 Hammond Road, Dandendong, Victoria (tel (03) 9768 2920; E-mail sales@satworld.com.au with extensive on-line web site at http://www.satworld.com.au.

Strong Technologies Pty Ltd has new street address - 60 Wedgwood Road, Hallum (Victoria) - was located at 1-3 Westpool Drive, Hallum.

DGT-400s. While we still do not know of any reliable software that will allow someone to convert these ex-Galaxy-Foxtel-Austar receivers to something useful (such as FTA Ku or C), the quantity of units has mushroomed. One NSW reader spotted more than 100 in a dump/tip complete with instruction manuals but less the remotes. For those filling their shelves, it remains an obscure "boat anchor" awaiting a software breakthrough. Latest sources: A Victoria reader found several with New Zealand's "Telstra-Saturn" label on the outer case paralleled by a similar sticker on the board inside! Have DGT-400 - will travel.

Albert Einstein when asked to describe radio. "You see, wire telegraph is a kind of a very, very long cat. You pull his tail in New York and his head is meowing in Los Angeles. Do you understand this? And radio operates exactly the same way; you send signals here, they receive them there. The only difference is that there is no cat."

SF#113 follow-up. Remember letter from SiamGlobal (p. 4, top letter)? If not, go back and reread it. Buy a IRD, no card, no CAM, just enter in "numbers" you acquire on Internet and you are "away" with various encrypted services? No, not Foxtel/Austar (using Irdeto-Two) but many others. We have one of these "miracle" IRDs on the way to SF for test and reporting. Stay tuned.

Kiosk Newspapers via satellite. First revealed by SatFACTS in SF#106, these free-standing machines now allow instant printed delivery of major newspapers from 141 different papers world-wide. A new owner (Adam Watt, Newspoint,Inc.) has acquired the Australia + NZ rights from Satellite Newspapers Suisse. The service now seems destined to become a standard feature of business public venues (such as airports). So much for early entrepreneur opportunity to make some money!

Towards a better understanding -

Ku LNBf Frequency Conversion: Which is the correct one and when

Most LNB products are judged first on their claimed noise figure, secondly on price, and lastly on ease of use for the particular application you have in mind. LNB is shorthand for "low noise block (downconverter)" and what it does is establish for the receiver that follows two important parameters:

1/ The sensitivity threshold (largely a by-product of the LNB noise temperature or figure), and,

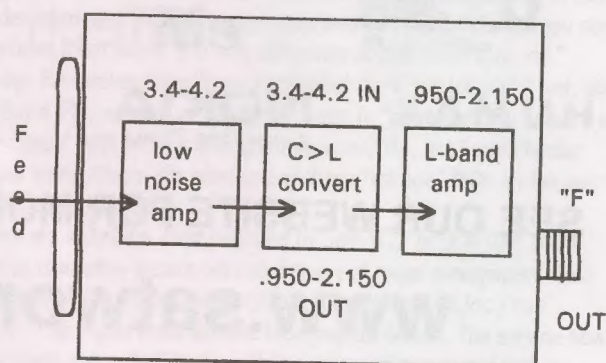
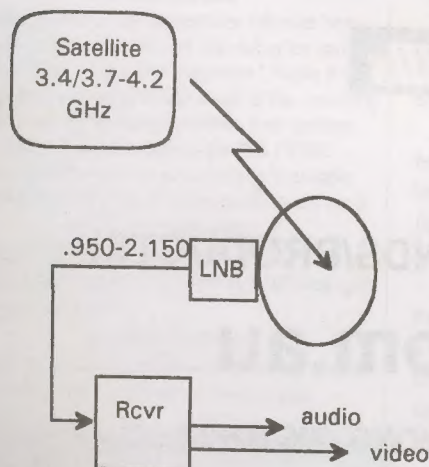
2/ The L-band frequency component which the satellite receiver requires.

When the first home dish systems appeared in the world (1976; C-band only because there was no Ku band in those days), the predecessor to the LNB was the LNA - low noise amplifier. It did only one of the two things LNB(f)s now routinely do - it amplified the signal with a noise figure or noise temperature which guaranteed the receiver to follow maximum system sensitivity. The "block downconverter" was indoors, built into the receiver proper which meant that the original satellite downlink frequency band (3,700-4,200 MHz in that era) had to be first amplified at the antenna feed, then carried or transported indoors to the actual receiver at its original satellite downlink frequency. Carrying 3,700-4,200 MHz indoors from the antenna required low loss cables - typically 1/2 to 7/8 inch in diameter costing dollars-per-foot and requiring special connectors on both ends that set the users back US$50 or more each! If you complain about running RG6 today, imagine what it was like 25 years ago installing cable twice the diameter of your thumb and then using flame-operated brazing tools to affix the oversized connectors to each end of the cable. Not fun.

Which bird - what Ku frequencies?
12,250 to 12,750 (11.3 LO):
I804/176E
PAS2/169E
PAS8/166E
Optus B1/160E
Optus C1/156E
Optus B3/152E
AsiaSat 3S/105.5E
NSS6/95E (12.5>12.75; Australia)
11.450 to 11.700 (9.750 LO)
I701/180E
I804/176E
Measat2/148E
10.950 to 11.200 (9.750 LO)
I701/180E
I804/176E

The first major step in maturity occurred when the downconverter was built into a weather tight container and mounted at the rear of the dish. Now short lengths of 1/2 inch size cable were connected from the antenna feed plus LNA to the outdoor downconverter and then wonder of wonders RG11 was run indoors. For the unwashed, RG11 is approximately twice the diameter of RG6 but was still much easier to install than the much larger original cables up to 7/8 inch in diameter. The second major leap forward came when the LNA was modified to include the downconverter inside the LNA housing - the birth of the LNB. At that point in development, the 1/2 inch size cable used for a short period of time between the LNA and the rear-of-dish downconverter was eliminated and RG6 could be run from the newly named LNB mounted at the antenna feed directly indoors.

The first LNBs were cumbersome and got off to a bad start when a California company (Dexcel) which pioneered the product insisted you had to purchase their complete system - LNB, receiver - to make the system work. Dealers who were more comfortable purchasing different component parts from a number of different suppliers were uncomfortable being told they had to purchase a "complete Dexcel system" to make this

Nomenclature: 1,000 MHz (megahertz) equals 1 GHz (gigahertz). Megahertz at L-band cover 950 to 2,150 while the same thing stated in gigahertz is 0.95 to 2.15.

The Numbers

C-band (3.4 > 4.2 GHz)

The incoming satellite signal is between 3.4 (3.7 some satellites) and 4.2 GHz (3,400/3,700 to 4,200 MHz).

The LNB creates a frequency "down conversion" to 0.950 to 4.2 GHz (950 to 4200 MHz) by using a "local oscillator" (actually a very low power transmitter) to "beat" or "mix" inside the LBF(f) with the incoming frequency. It is a simple matter of elementary math (see below). For C-band, the "local oscillator" operates at a (standard) frequency of 5,150 MHz (5.15 GHz). This is called a "high side" LO (local oscillator) and as the LO is on a frequency greater than the incoming satellite signal, the "difference" between 5,150 and the actual C-band reception frequency is the after-mixing "product" which falls someplace between 950 and 2,150 MHz. Example: 5,150 - 4,000 equals L-band 1,150.

Ku-band (12.25 > 12.75 GHz)

While the standard (Optus/SingTel B and C series; PanAmSat PAS-2, 8) satellites presently confine Ku band transmissions to the 12,250 - 12,750 MHz region, others (NSS-6, Intelsat 80X, 701, Palapa, AsiaSat) use frequencies lower than this range; still considered "Ku-band." The LO in the Ku LNB(f) operates lower than (below) the incoming satellite transmission band but the principal is the same as with C-band. One is a "larger" number than the other - the "difference" is L-band. The "standard" Pacific region Ku LNBf has a LO (local oscillator) of 11,300 MHz (11.3 GHz). By changing the LO to a different frequency (such as 10.7 GHz), a new "segment/portion" of Ku band can be frequency-converted into the standard L-band receiver tuning range. Virtually all receivers available have a standard L-band of 950-2,150 MHz and the LO determines where signals appear.

The math

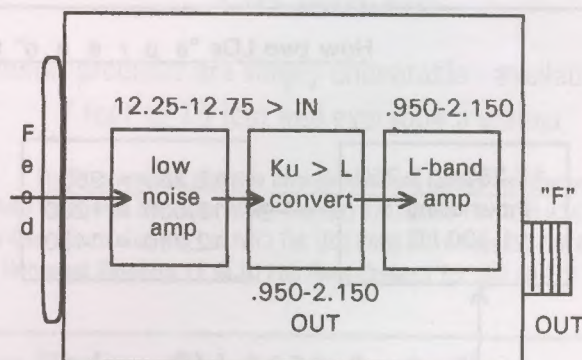
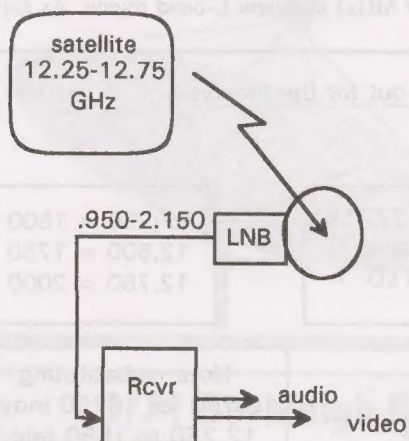
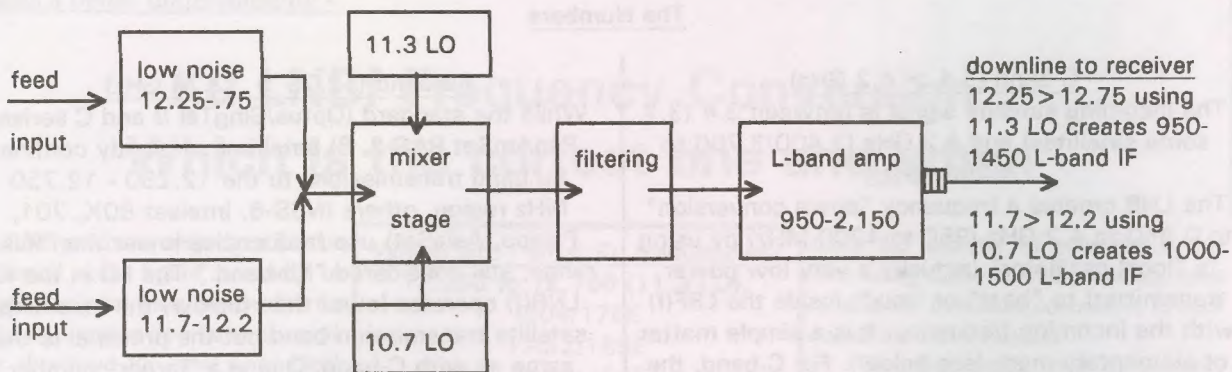
C-band: Start with 5,150. Determine the incoming satellite transmission frequency. Subtract this from 5,150 and you have the L-band receiver frequency.

Ku-band: Start with Ku transmit frequency. Determine the LO frequency, subtracting it from the incoming satellite frequency. The "answer" is the L-band frequency.

innovation work. It would be more than two years after Dexcel pioneered the LNB approach before the industry adopted it as a common sense answer. hat we take for granted today did not "just happen."

LNB now equals LNB(f)

Although some pioneering consumer reception packages using Ku band (the 12 GHz frequency region) were on offer as early as 1984, it would be the mid 1990s - less than ten years ago - before Ku really took off. By this point in time much of what we accept today as "common" was at least out of the laboratory stage and into mass production. The third and final evolutionary step occurred when the antenna feed was integrated into the LNB turning the LNB into the LNBf ("F" denoting the feed portion). With the explosion in Ku band popularity, LNBf products steadily during the 90s came down in price and the quality went up. Barely five years ago the 0.6 to 0.8 dB noise figure LNB/LNBf we now find widely promoted in the A/NZ$50 and down range was commanding $300 and up.

The latest LNBf technology offers a wide variety of installer system options: Two or more satellites from a single device, simultaneous vertical and horizontal polarisation conversion into either one or two RG6 downlines, multiple receivers connected to the single LNB(f) device each with independent access to two or more satellites and both polarisations - to name but a few of the options out there.

The math of two separate LOs

The goal is to frequency convert the incoming Ku signal to someplace within the receiver's tuning range (950>2150MHz). The mixer requires two "inputs" to create one "output." Input number one is the low-noise-amplified satellite signal. Input number two is from the LO (local oscillator). The mixer is a "plus and minus" stage - it sums (adds together) the two inputs (such as adding 11,300 to 12,280 which creates 23,500 MHz!) and it subtracts one from the other (12,280 - 11,300 = 980 MHz). When there are two LOs inside the LNB, the user selects which LO is to be used with a command originating at the receiver. Only one LO is operating, or connected to the mixer, at a time.

One of the most popular options is to build two separate LNBs into the LNBf case. This is done with clever configuration of the LO or local oscillator segment.

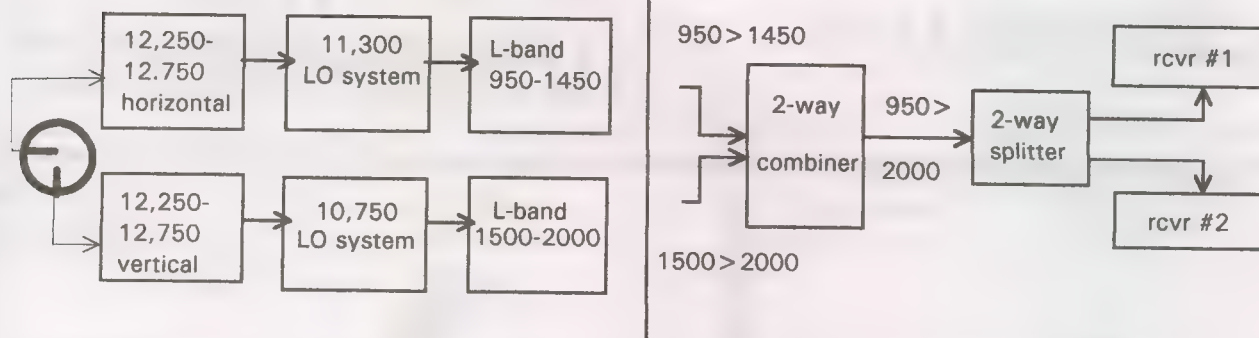
LO equals local oscillator

Read the name plate on any LNB/LNBf, study any literature and you will see "LO" followed by a number. That number tells you what frequency range the LNB/f is capable of delivering to your satellite receiver. Here's how that works.

More than ten years ago, the firms designed and manufacturing satellite receivers standardised on a receiver input frequency range. Originally it was 950 to 1450 MHz (megahertz). That then grew in several steps to today's 950 to 2150 MHz. This frequency range (950 - 2150) is known as "L-band" in the trade - the "L" designation dating back to World War Two military nomenclature (different frequency groups above 1,000 MHz have letter nicknames).

It does not matter to the "L-band receiver" whether the original satellite transmits on C-band (3,400 or 3,700 through to 4,200 MHz), or, Ku band (variously between 10,950 and 12,750 MHz because the satellite receiver is not a "C-band" or "Ku-band" instrument. It is an "L-band" receiver. Which takes us back to the downconverter at the antenna feed/dish. The original reason why designers wanted to get the downconverter out at the antenna proper as to eliminate that 1/2 to 7/8 inch expensive, and difficult to install low-loss cable. Ideally, they would like no cable at all interconnecting the two but as that is impractical, they settled for the smallest readily available cable already in commerce; RG6. RG6 had become popular in the 1950s and 60s when cable television began to use it by the millions of miles per annum; nothing drives down the price of a commodity like making "millions" of the same item.

To go from the dish (outside) to the receiver (inside) in RG6 became practical after the downconverter moved out of doors. Now the signal travelling between the dish and the receiver was in the 1,000 MHz or L-band region; a frequency segment where RG6 performed adequately. The same RG6 if asked to carry C-band (3,700-4,200 MHz) signals gives up and dies after a very short distance-measured in feet, not hundreds of metres. And when Ku band came along, at a frequency three times as great as C, well, you might get by with several inches of RG6 but no more than that - the cable was simply physically too small (and created too much loss per inch of signal travel) to have any usefulness at Ku. So the local oscillator or LO is the answer - it makes it possible to change the incoming satellite frequency band (whether 3,400/3,700 - 4,200, or, 10,950 - 12,750 MHz) to a new L-band region. As explained

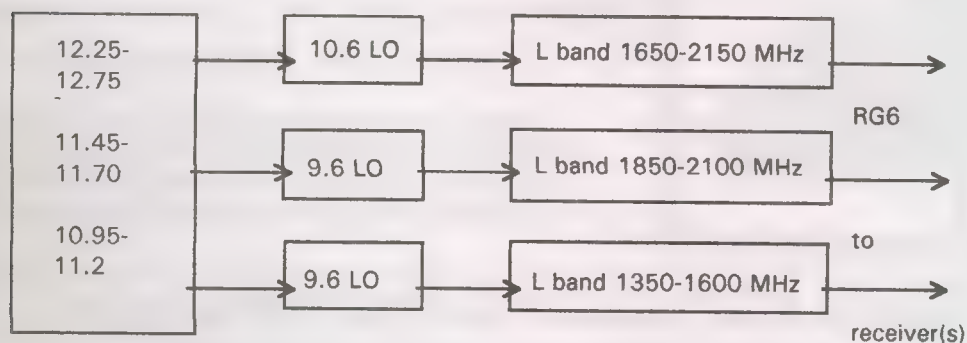
Marrying two LOs to "s p r e a d" the band out

In this example, the LNBf is equipped with twin LNBs (sharing a common housing), one of which is connected full-time to the vertical probe of the feed antenna (lower, left) and the other is connected full-time to the horizontal side. Both input 12,250-12,750 MHz but one has a LO of 11,300 while the second has a LO of 10,750. Horizontal then exits the LNB at 950-1,450 MHz while the vertical leaves the LNB frequency converted to 1,500- 2000 MHz. As these are two separate (contiguous) frequency bands, they may now be combined into a single cable (RG6 to the receiver). The receiver now can tune the horizontals and the verticals without sending a polarity change "signal" (voltage) to the LNBf. Why is this an advantage? Because now two (20, 200 etc.) separate receivers can be connected to the twin-LNB and any receiver can select any horizontal (950-1450) or any vertical (1500-2000) satellite signal independently. *Any receiver, any channel,* upon demand.

here, separately, the local oscillator is 50% of a two-part electronic tag team; the "mixer" is the second half.

A local oscillator/LO is a signal generator and when it is connected to a "mixer" stage two things happen.

Provided. The mixer requires two "input" signals to function. One is the LO, the other is the actual antenna delivered satellite signal(s). When both are applied to the mixer, it "mixes together" the two inputs and creates one - actually two - outputs. First it sums the two signals - just as you would do when adding two numbers. A 4,000 MHz signal added to a 5,150 MHz LO signal leaves the mixer at 9,150 MHz. Simultaneously, it creates a "difference frequency" - the lowest number (4,000 in our example) electronically "subtracts" from the highest number (5,150 LO frequency) and now we have 1,150 MHz as well. The frequency difference between the sum (9,150) and the difference (1,150) is "huge" which means that if we place a third electronic circuit after the mixer - a "filter device that has been created to only allow the difference frequency range to go past the filter circuit, then we lose, drop or eliminate the sum frequency (9,150) immediately. Only the difference frequency (1,150 MHz) remains.

This is L-band. On purpose, by design. Now we have a new frequency which has all of the original content of the 4,000 satellite signal only we recreated it at 1,150 MHz. The advantage is significant - we can transport and distribute 1,150 MHz in RG6 cable; something impossible for the original 4,000 MHz satellite frequency. After the LNB further amplifies the L-band difference frequency, it is sent through our low cost, easy to install RG6 towards the satellite receiver. Which, by design, is a L-band receiver anyhow - not a C or Ku.

Popular "Universal LNB(f)" format uses dual LO (local oscillator) signal sources for mixer. LO at 10,600 (10.6 GHz) frequency converts standard 12,250-12,750 band to high-L-band (1650-2150) while second (lower frequency) LO at 9,600 (9.6 GHz) translates 11,450-11,700 to 1850-2150 and 10,950-11,200 Ku band segment to 1350-1600 MHz. See text for special concerns.

By varying our LO frequency (and mixer design) we can convert or frequency transpose virtually any original frequency to any other desirable cable-transport frequency.

Clever is as clever does

If you can do this once, how about twice? Is there any sound reason why two (or more) LOs cannot be stuck inside of the LNB(f)? Better yet, why would we want to do this?

There are three frequency ranges involved in each LNB design. First there is the incoming satellite frequency range, such as 12,250-12,750 for Optus. Second is the L-band receiver frequency range, such as 950 - 2,150 MHz. The Optus bandwidth is our input, the L-band spectrum our output. They have a mathematical relationship defined by the frequency chosen for the LO. Obviously if the Optus frequency coverage range is 500 MHz (12,250 to 12,750) and the L-band receiver tuning range is 1,200 MHz (950 to 2,150 MHz) , we have a wider or bigger window at L than our input range requires. Which means we have some latitude, or playing room, when selecting the "correct" LO frequency.

Assume 12,250 as the input, and 950 as the output. This is a "difference" example: 12,250 minus 950 = 11,300 (MHz). Now consider 12,750 as the input and 11,300 as the chosen LO frequency. The difference now is 1,450.

But the L-band receiver really does not care where in its 950 - 2,150 receiving range the original signal falls. So in fact a LO of 10,600 will also work (12,750 minus 10,600 equals 2,150). As would any LO between our first example (11,300) and our second example (10,600).

Now suppose you have a need to receive 12,250 - 12,750, and, say 10,975 as well as 11,610 MHz (such as from I701's Canal+ service). You could do this with two separate LNBf's (one equipped with a 11,300 LO, the other with a 9,600 LO), or, you could build two LOs into one LNBf and on command from the receiver turn off one of the LOs while switching the other one "on." Now you could swing your dish from any of the trio of Optus birds (all using 12,250 - 12,750) over to I701 where the 9,600 MHz LO would be turned on and you would find 10,975 at 1,375 L-band and 10,610 at 2,010 L-band.

At C-band the LO is above (higher than) the incoming signal frequency (5,150 being the LO "standard" here). At Ku band, for sound design reasons, the LO is lower than (below) the incoming frequency range. But the principal is identical - the "difference" frequency, between the highest (LO at C, signal incoming at Ku) and the lowest (signal incoming at C, LO at Ku) always equals L-band - someplace between the receiver's 950 - 2,150 MHz tuning range.

Extra clever is ...

If you can house two (or even more) LOs inside of the LNB(f) and by remote control from the receiver turn one on and the other off, at command, could you not also have both operating at the same time? Yes, and, no. To do this, you require two (or more) LOs and two (or more) mixer stages in the LNB(f) housing. After the mixer and an appropriate "filter" to eliminate the "unwanted sum frequency" in fact the L-band remaining can be added - if you are clever.

One such design appears at the top of page 10.

Assume you have only 12,250 - 12,750 but this incoming frequency range is used twice - once by horizontal polarised signals and then by cross-pole or vertical signals. So we actually have two frequency bands, identical in bandwidth and parameters - 12,250 - 12,750 vertical and the same again horizontal. In most LNBf designs, the receiver switches from one voltage (such as 13 volts to the LNB) to connect to say the vertical signal and then it steps up the voltage to 18 volts to turn off the vertical and turn on the horizontal. What this is doing is commanding the LNB to internally switch from the tiny vertical probe "antenna" in the feed to the companion horizontal probe.

But suppose you wanted both turned on full-time because you were using a pair of LOs - one to full-time process the vertical side, the other to full-time process the horizontal side.

Now, as the diagram on page 10 illustrates, the horizontal probe feeds signals into a mixer which has a LO of 11,300; the "standard" Optus configuration. And this produces a L-band output of 950 to 1450 MHz. While simultaneously the vertical feed antenna probe is sending the opposite 12,250 - 12,750 polarity signals into a second mixer which has its own LO at 10,750. This recreates 12,250 vertical at 1500 and 12,750 at 2,000. After LNB frequency filtering, horizontal occupies 950 - 1450 and vertical simultaneously is at 1,500 - 2,000. Now the two can be "combined" into a single downline of RG6 and sent to the receiver(s). Note: Changing the vertical LO to 10,700 sends 12,250 to 1,550 and 12,750 to 2,050.

If LNBf's automatically switch from V to H to V on receiver command, why go to this bother and trouble to have both full-time on the same cable? Multiple receivers.

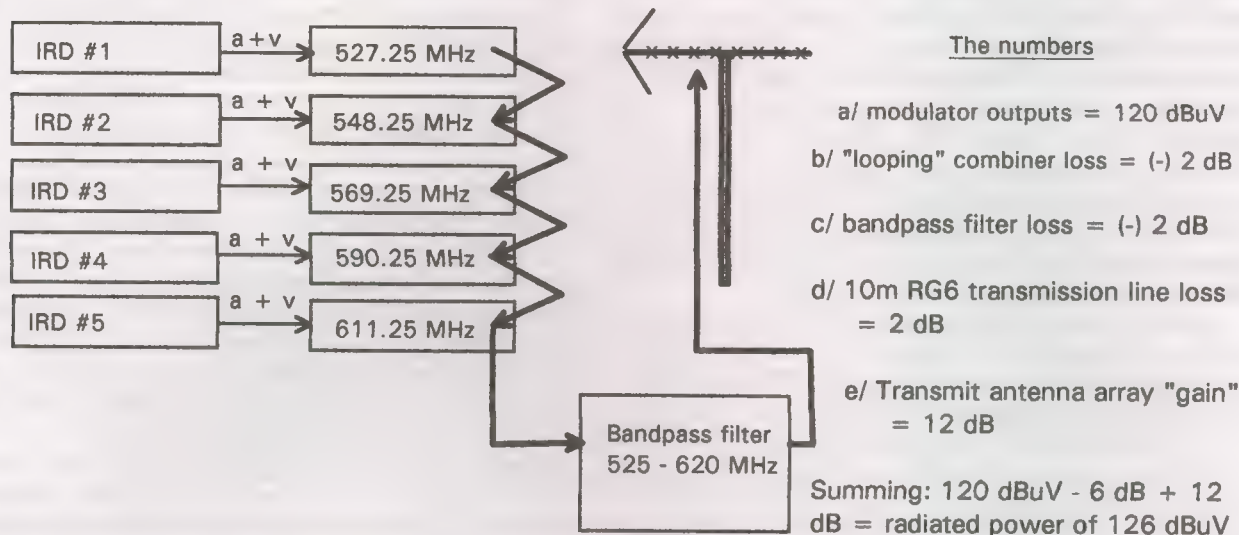
Switching works fine when there is only one receiver at the end of the RG6, or, if additional receivers will be happy to watch the same polarity as the "master control" receiver. But in some commercial installations, each receiver must have totally independent selection between V and H and while you could run two cables (one for vertical, one for horizontal) to each receiver and let the user switch cable inputs at the receiver, why bother? If your V and H can "fit" into the single, same RG6 cable, and you eliminate any switching at all, why not? The slightly higher price for the two-for-one polarity LNBf is more than offset by your eliminating the extra-second cable run and the switching system challenges that go with each receiver switching cables when it switches polarity.

Final step

If we can stack two polarities on a single cable by choosing our LO frequency carefully, how about combining two antennas into a single RG6 downline? Suppose you had one antenna pointed at B3 and another pointed at Optus C1, vertical side. The B3 antenna uses a LO of 11,300 and recreates 12,250-12,750 in the 950 - 1450 L-band region. The C1 antenna uses a LO of 10,600 and recreates the V-polarity services in the 1,650 - 2,150 region. With B3 in the lower 500 MHz of the L-band region and C1 Aurora in the upper 500, leaving a 200 MHz "guard band" between the two, the pair of antennas can now be combined (using appropriate combining equipment) and sent down the same cable to the one or more receivers at the other end. And this, as in our previous example, again eliminates running a second RG6 line and involving line switching equipment at the receiver(s).

LNBf technology is a rapidly developing aspect of our business. As more satellites come on line, new solutions which reduce the number of wires and expand the usefulness of the wide bandwidth L-band receivers will follow. The LNB creators are very aggressive folks and their ability to adapt new microwave technology to the changes in satellite frequency use (especially with the multiplicity of Ku bands eventually to be available) is considerable. Though all of this, the L-band receiver (950-2150 MHz) is the basis for all.

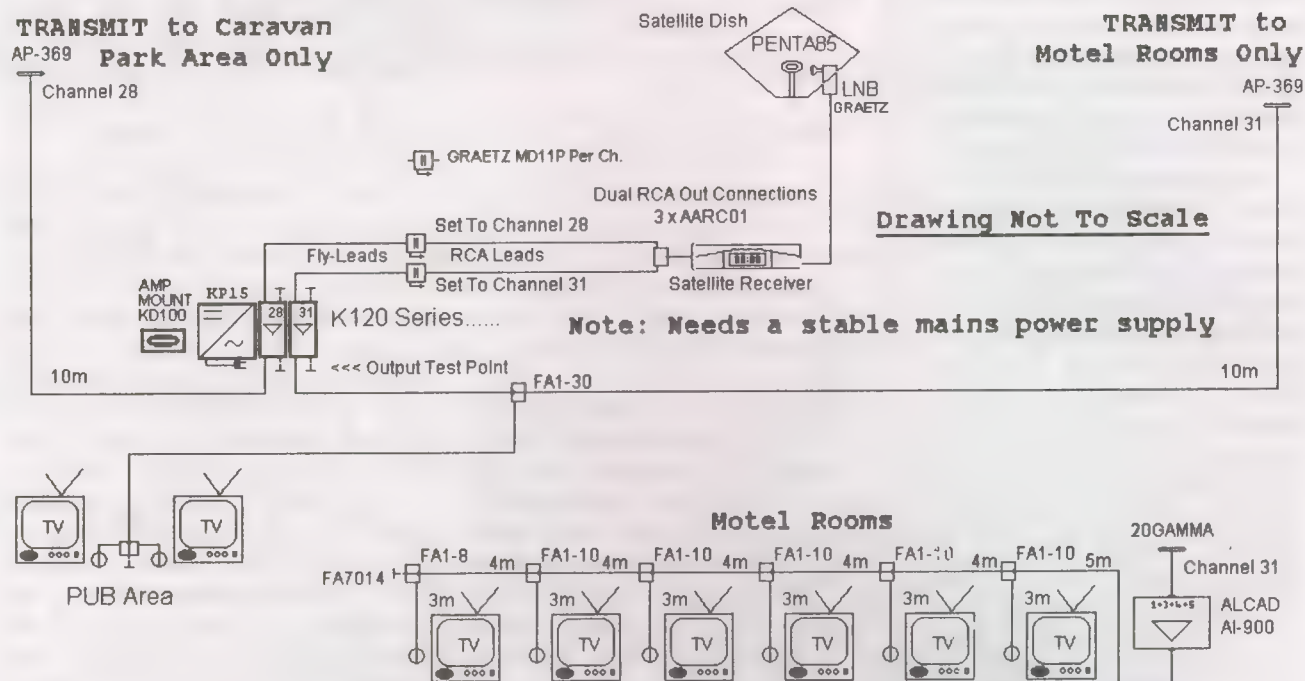
Eliminate the cable

Using Band IV and/or V modulators to feed pay-TV through the air to motel units

SatFACTS in previous issues (#88, #98, #105) has provided user-friendly details on taking MATV/SMATV grade amplifier equipment and using it for rebroadcast purposes over relatively short distances (hundreds of metres to kilometres). An amplifier/modulator capable of creating 120 dBuV is generating 0.1 watt of "transmitter power" and when this signal level is married to a gain-additive transmitting antenna of say 10 dB (passive) gain, the 130 dBuV radiated (sent through the air) signal (made up from 120 dBuV amplifier/modulator gain + 10 dB of antenna gain) is now in the close-to-one-half-watt region. Many low power relay or TV "translator" devices operate with only one watt of power. The applications for this technology vary from serving isolated ranch buildings on a large land spread to replacing cumbersome to install coaxial cable in a sprawling campground or motel complex.

Material in this report assembled from field experiences gathered by personnel at Laceys.TV 12 Kitson St, Frankston, Victoria 61 3 9783 5767.

Loss is loss

When you elect to connect point "A" to point "B" using coaxial cable, the loss per metre of cable is constant - the fractional amount of dB lost (eaten up by the cable resistance) in the first metre of cable will be duplicated by the loss in the last metre - and each of the other metres of cable in between. You have a choice. Substitute "air" for cable; send the signal(s) through the air from "A" to "B." Here the loss is quite significant in the first metre/5 metres/10 metres but then it abruptly levels out. If you begin with a modulator providing 120 dBuV of output power at 600 MHz, and launch it through the air to a point 1 kilometre distant, with an appropriate

Component parts in any rebroadcast system determine the quality of the transmitted signals, the range (distances) covered, and the potential for the system to create interference to others.

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receive end reception antenna, you will have a minimum of 20 dB more signal to work with than if you had strung 1,000 metres of RG6 for the same kilometre. Through the air losses are very high for the first ten metres or so, and then they become quite manageable - approximately 6 dB more loss for each doubling of the transmission distance (example: at 100m you measure +70 dBuV, at 200m you will measure +64 dBuV, at 400m +58 dBuV and so on - losing 6 dB each time the last distance-marker doubles). It should be obvious that you can install a transmitting antenna at "A" and a receiving antenna at "B" much faster than you can run out and protect 1,000 metres of RG6 (or 11).

Tr antenna

1/ best possible impedance match to 75 ohms
2/ low in-channel or channels ripple (variations in match, gain)
3/ transmission coverage "pattern" to match intended service area
4/ "F" connector direct feed
5/ mechanical integrity to withstand weathering

Another significant advantage of using the air - if there are *several* receive points "B", with cable you'd have to loop from one to the other to the other until all were "plugged in." With "air" as a transmission medium, one transmission antenna at "A" followed by as many *separate* "B" reception antennas as the system requires; *no interconnecting cables.*

A practical system

Not all systems require a 100% through-air solution. One example, worked out by Lawrie Carr on behalf of Lacey.TV, appears above (1). Two transmit channels (using K120 series modulators) operate on UHF channels 28 and 31. Their outputs are mixed (multiplexed) in the KD100 modulator / KP15 power supply modules into a single (RG6) output line. In this system, Carr has created a trio of outputs - one feeds signal to a Caravan Park allowing travellers to access satellite delivered TV through their UHF band TV sets. A second feeds a much level reduced (-30 dB) service to a pair of TV sets in the facility's pub (120 dBuV minus 30 dB = 90 dBuV to the TV sets - further reduced to 86 dBuV in a 2-way splitter feeding a pair of TV sets). The third output leg goes to a separate (model AP-369) transmitting antenna which is directed towards another physical segment of the facility - six motel rooms. These rooms receive their input *through the air*, which is amplified (ALCAD 900), and then distributed to each room through FA1 series directional couplers (FA1-10 means the level to a room is 10 dB below the amplified *line* level).

1/ System design is a service offered by Laceys.TV to clients utilising specified brands of equipment.

When you install a series of consecutive room taps like this, you begin by knowing (calculating first, then verifying on the spot) the actual level coming off the receive-antenna. The mathematics looks like the table here.

It is dangerous to "lose" 3 or 6 dB of "power" when you are working with under-one-watt region transmitter signals. The typical commercial TV transmitter operator assumes the viewer will install a less-than-efficient reception antenna and jacks up the transmitter power to compensate or offset the deficiency expected at the receive end. In a low power installation, the burden of where the "dBs of gain comes from" is shifted to the receive side of the equation - lacking dB of transmitter power, it becomes the responsibility of the receive system designer to "make up" or replace the dBs missing at the transmitter end - at the receiver end of the circuit. When 3 (1/2 power) or 6 (1/4 power) dB is lost through careless installation/ engineering at the transmit side, it may have to be made up at the receive side. This can involve a lager, greater-gain receive antenna, or the addition of a (low noise figure) masthead amplifier.

In a complete circuit, a dB is a dB is a dB. If it is lost on the transmit end, it can (within certain limitations) be *replaced* by the receive side of the system.

Signal level - at receive antenna: **60 dBuV**

Line loss at end of in-house system: **-5 dB**

Desired input to each TV set on system: **80 dBuV**

Gain required at antenna: 80 + 5 (line loss) = 85 dBuV - aerial input level (60 dBuV) = **25 dB gain**

Errata: Using 10 dB directional coupler/taps adds 10 more dB to gain required. Net gain in amp = **35 dB**

Explanation: A 60 dBuV signal is delivered by the antenna, fed to a 35 dBg (+) amplifier raising the level to 95 dBuV. At the first TV set location, after 1 dB of cable loss, a -10 dB coupler reduces 94 dBuV to 84 dBuV - at the TV set. In the next five TV outlets, additional 1 dB increments of cable loss occur so that at the end, set # 6, we have 94 dBuV less 5 dB coupler thru losses and cable losses resulting in 89 dBuV to the final TV set through a -8 dB coupler (equals 81 dBuV).

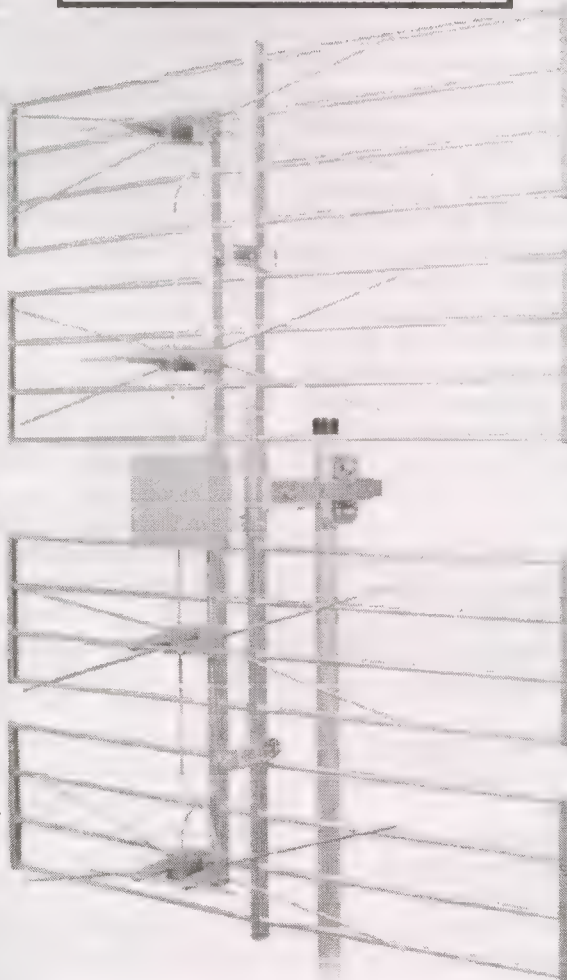
The hardware

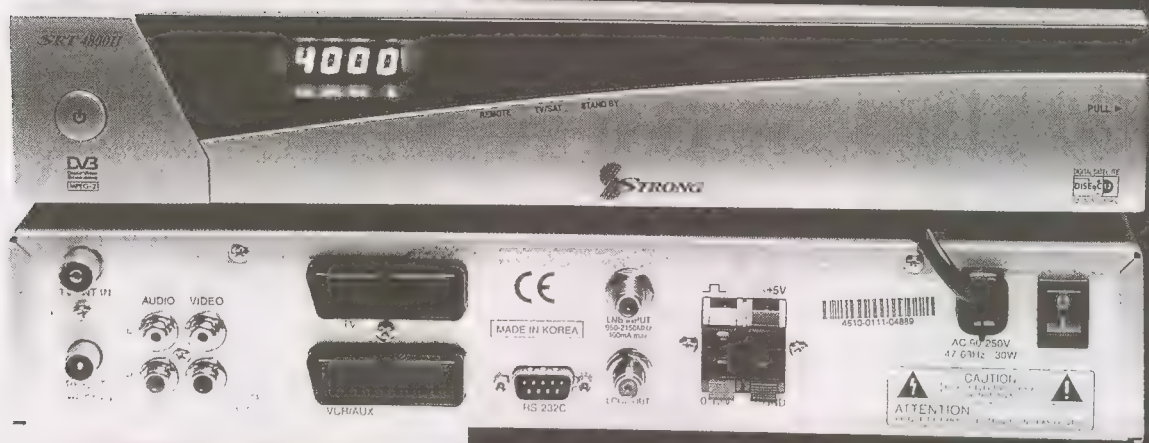
The satellite receiver demodulates the signal, delivering audio + video to the modulator. The modulator is user-set channel-specific and various "grades" (price ranges) deliver signals with varying levels of (1) strength, and, (2) picture quality. As Lawrie Carr has done here (diagram, p. 13), the modulator can be a stand alone device to be followed by a (transmit) power amplifier. His choice was a Graetz MD11P from Laceys.TV. Few modulators generate 120 dBuV of signal level (quantity) so in each case he has followed the modulator with a "transmission power booster" stage - the K120 series of 28 dB gain amplifiers. This is how he arrives at 120 dBuV with a modulator capable of far less output "power." Modulators are either VSB (vestigial sideband -filtered) or DSB (double sideband). A DSB version is always cheaper (less costly) but it presents new problems. Number one, it transmits twice as much video information (bandwidth) as the TV set requires. This instantly reduces the transmission power by 3 dB (1/2 power) with no benefits whatsoever.

Why? Because a double sideband signal contains the same video information twice - *two times*. It is redundant because the TV set only requires that information *one time*. DSB modulators are cheap, and found in VCRs, home game devices and that ilk of low grade devices. VSB (vestigial sideband) modulators are found in "real" TV transmitters and cable TV products.

In addition to wasting transmitter power, they also waste spectrum space - occupying not one but two consecutive TV channels simultaneously. If the modulator is on channel 28, it will also occupy channel 27 (the next lower channel) as well - because it is twice as "wide" as it needs to be. Some modulator products are VSB but still require an accessory "filter" if they are used in an adjacent channel situation (such as two separate modulators - one on channel 28 and another on channel 27). Over the air retransmission seldom (if ever) uses two adjacent channels for reasons beyond the space available here to detail.

Modulators? Don't skimp here. Buy a model that is VSB because along with the VSB "filtering" comes vastly improved video characteristics - directly affecting the "quality" of the image being transmitted.

Power amplifiers. When you have a one channel system, the output of the power amplifier (per Lawrie Carr's system) can go directly to the retransmission antenna. One output, one feedline, one transmit antenna. Simple. But when we have two or more channels to be transmitted, they must somehow be "combined" so that each channel ends up going into the transmission antenna. The quick and dirty approach is to take a signal splitter (2-way, 3-way, 4-way as required by the number of channels) and using it backwards, "combine" signals into a single transmission line to connect to the transmission antenna. What's wrong with this approach? A splitter used

AP-369 "phased array" for transmitting

continues - page 18

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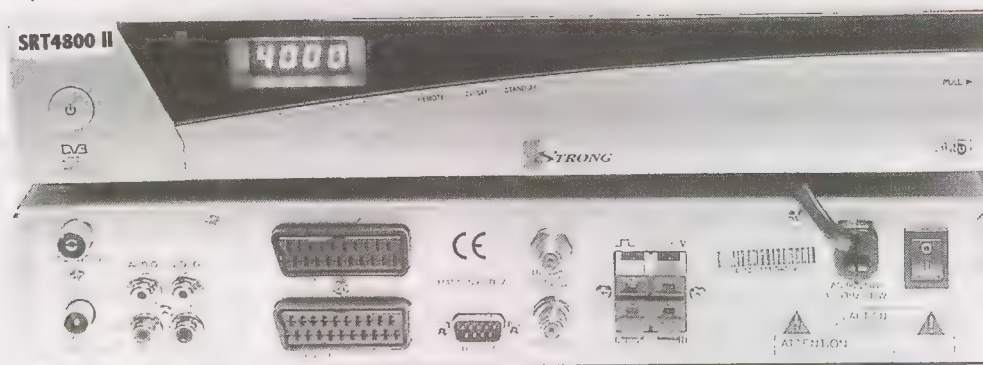
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"backwards" as a combiner has loss - lot's of loss. For example, combining two channels with a backwards splitter reduces the input to the antenna by not less than 4 dB per channel; a 4-way combiner, 8 dB per channel. After having gone to some effort to build up a 120 dBuV (1 RF "volt") signal at the modulator, knocking it back by 8 dB to under 0.4 volts (112 dBuV) through a combiner on the way to the transmitting antenna is not an intelligent decision.

out#1
out #2
input
4-way
splitter
out #3
out #4

Splitter as a signal divider: 4-way delivers approximately 20% of total input to each output.

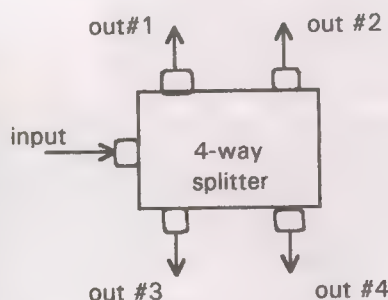
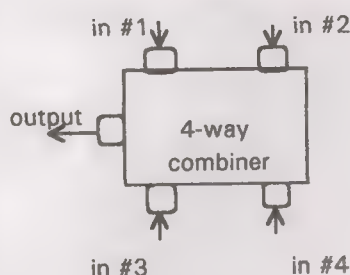
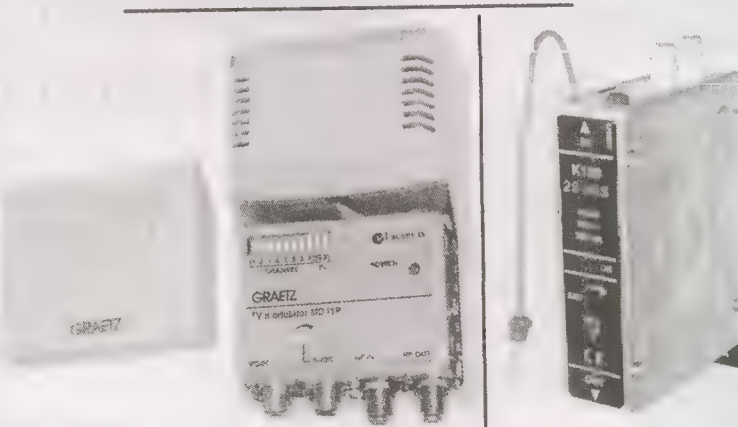
Splitter as signal combiner: 4-way delivers approximately 20% of original input to combined output.

There is another way - "series combining" where one channel "loops" to the next (to the next, etc.) with typically 2 dB loss per channel. Lawrie Carr uses this approach in his p. 13 diagram. A 2 dB loss is still something, but far better than a 4 or 8 dB loss. Selecting an amplifier system that allows you to "loop-combine" rather than forcing you to externally "splitter combine" is a wise choice.

The transmitting antenna is yet another consideration. Every antenna has a "coverage pattern" whether it is used for transmit or receive. If the ground you need to cover is shaped like a cone, spreading gradually in one direction, it makes no sense to select an antenna that radiates outside of the "cone" you wish to reach. When you start with 120 dBuV, and connect it to a transmit antenna with a coverage pattern of a circle - and you only have viewers in a one quarter circle area, why waste valuable transmission power on the 3/.4 circle that has no viewers?

Which is one of the reasons why a reasonably accurate scaled-diagram should always be a starting point - pinpointing where the transmitting antenna must go (usually determined by where the modulator/satellite receivers must be located) - and then identifying where the viewing locations are in relation to the transmission antenna.

Graetz MD11P modulator produces VSB grade signals suitable for most transmission applications (left) but requiring a power "boost." K120 series amplifier (right) does just that, to 120 dBuV. Graphics courtesy Laceys.TV.

By selecting a transmission antenna with a "sculptured" coverage pattern that best fits your desired coverage area , no transmitted signal is "wasted." The wrong (incorrect) antenna choice can easily reduce signal strength levels in your desired coverage area by 3 (1/2 power) or 6 (1/4 power) dB - making the task of selecting the correct reception antenna system more difficult in the process. The larger the area (portion of a 360 degree circle) to be covered, the lower the amount of signal available to a specific segment of that circle. In most situations, if you have a distance greater than 1km to reach, the transmission antenna should be located (with the companion modulator and equipment) at "one end" of the area, shooting signal through it from one end to the other; not in the middle where you are forced to "spread" the available signal in a circle around the transmission site. The transmission antenna selected does this for you. Moreover, when the area to be covered is a "sliver" (a narrow cone shaped area), a transmission antenna with more "gain" (signal amplification power) becomes practical - not so when the area to be covered is a complete or nearly complete circle.

Filtering. No MATV/SMATV "modulator" is going to be completely free of harmonics and other unwanted artefacts. These are signals, outside of the transmission channel, which are generated within the modulator. Because they are not within the transmission channel, some attenuation of these unwanted signals occurs in the transmission antenna. The correct method of reducing these unwanted signals (which could interfere with a local cell fone site operation, other TV transmissions, even radio services) is to install a "bandpass filter" between the system's output amplifier(s) and the antenna. A filter is a passive device designed to pass a certain group of channels (or a single channel) while attenuating (stopping) any signals on other frequencies. On purpose, it is typically a TV channel wider than the lowest and highest channels in your system to ensure they are not effected by the filter's attenuation system. If you are transmitting on channels 28, 31, 34, 37 and 40 - for example - the filter would "pass" (allow through) channels 27 through 41 but stop all others from reaching the antenna. The filter is a "dumping ground" - stopping unwanted modulator or amplifier generated signals from reaching the antenna and then being radiated through the air.

Careful attention to detail will maximise the distance covered and the quality of your retransmission system. Improper selection of hardware will reduce your coverage, muddy the images transmitted and possibly create interference for others in your geographic region.

Cover Story

Optus + Pay-TV "drop the hammer" on piracy cards - Chaos follows

Nobody accurately knows the number of non-paying Foxtel and Austar viewing homes who prior to late January were happily channel surfing their popular brand receivers powered by a gold or fun or some other grey market conditional access "card." Estimates run as high as 25,000 and even Foxtel has suggested it could be higher - much higher.

Numbers. Foxtel during the current fiscal year has been "growing" at the overall rate of around 3,000 new subscribers per month. That's a "net gain" number - after eliminating the 18% of prior subscribers who will, over the course of the year, de-subscribe because of their disenchantment with the value of the service. Or perhaps they ran into a better deal - somebody at a local pub who offered to sell them an "access card" that "never turns off, upgrades you to the full set of channels," for a fee in the region of A$200. Someone paying A$40+ per month when offered a new card that claims the ability to double the number of channels for the equivalent of 5 months fees to Foxtel has to be tempted. Very tempted.

It all came down to a bad decision made by Optus when they were launching their Aurora service (1998); they bought into the Irdeto (Mindport) tale that Irdeto-One was a hack and piracy proof conditional access service. Alas, it was not and by the time 20,000 and then 30,000 and then 40,000 rural families had signed on for the Aurora service package, the hack ability of Irdeto-One was well known. And mistake number two. Galaxy, in searching for a suitable digital receiver, ended up with Pace DGT400 versions which also used Irdeto-One. It would evolve that a simple hack of an Aurora Irdeto-One card would turn it into a Aurora plus Galaxy card. For the cost of the hack, Aurora viewing homes gained access to Galaxy.

When Galaxy folded up in bankruptcy (May 1998), Austar was a new comer and Foxtel assumed the prior provider position of Galaxy. But the hardware (the Pace receivers) and the software (Irdeto-One) remained in place. By late in 2003, ten thousand, twenty thousand, perhaps even more of the Irdeto-One compatible receivers were in non-pay-TV consumer hands. Not one of these was a UEC product (although UEC continue to sell and had grown past 50,000 in the field ostensible for Aurora only). In theory, any of the UECs and all of the non-UECs when fuelled by a piracy card had instant access to all or almost all of the Austar (+ Foxtel) service channels, for the price of a grey market card.

The same piracy technology that made this possible (built upon the original inadequacy of the Irdeto-One CA system) also affected subscribers to the Optus operated Sky TV network (on behalf of the horse racing enthusiasts). Several thousand pubs, hotels subscribed to this service - several hundred did not but had it anyhow using piracy card technology. Sooner or later all of this was to come to a head.

Sooner or later is now, starting in the third week of January just passed. Irdeto-One is being phased out, and a number of piracy formatted cards have stopped working - perhaps as many as 10,000 are today "joker cards" with no hope of being reclaimed for their original intended use.

What happened?

The easiest way to rid themselves of piracy cards was to turn off Irdeto-One. But before that could happen, a new replacement had to be in place and all of the authorised, money-paying subscribers had to be converted over to the replacement. It is variously known as "Irdeto-Two," or "Mcrypt." Unlike Irdeto-One, it has so far proven to be hack-piracy resistant.

One source from the piracy world advises SatFACTS, "They (Foxtel) are using a technique of turning off blocks or groups of Irdeto-One cards, after sending the legitimate subscribers of record using these cards new replacement cards with the Irdeto-Two format." These would be the so-called "Red Cards" distributed by Foxtel during December and January. Customers were told to replace their old (Irdeto-One) cards with the new cards, and then telephone a toll free number to have the new cards "switched on." After a reasonable time for this to happen, Foxtel simply shut off Irdeto-One cards with consecutive serial numbers in that batch - such as serial numbers 0001 through 9,999. And they moved on to the next group (10,000 to 19,999). Many piracy cards were "cloned from" (directly related to) these early serial number Irdeto-One cards and when their "master card" went down, so too did their "clone card." Technically - "the old cards don't get updated anymore and when the next ECM (Entitlement Control Message) is sent, the old cards are left behind as no EMM (Entitlement Management Message) command reaches them."

Confusion followed. "Some" gold/piracy" cards had quit, others still operated. For those still operating, it would only be a matter of time (or dumb luck if by some chance they escaped

the purge; Internet rumours suggest early March as the final date when Irdeto-One will be operating on Austar-Foxtel). Internet chat room sites proliferated with messages like this:

"My Foxtel has quit."

"Tough luck - mine still operates."

Foxtel of course was hopeful that out of the tens of thousands of piracy viewing homes, a high percentage would be so "hooked" on the service that their next step would be to request a real, "paid for," subscription. When they have been "growing" at the abysmal rate of 3,000 net gain per month, picking up 10,000 or more new ex-piracy homes would be a major economic shot in the arm.

But the techniques employed by Optus on behalf of Foxtel (and Austar) were more complicated than that. First there were the original UEC receivers intended only for Aurora's service package - never for Foxtel or Austar. The original UEC 642 receivers had been followed by the updated UEC 660 and each has a different software routine capability inside. In theory, because neither Austar nor Foxtel ever put UEC 642 or 660 models into the field for their own paying customers, could they not with the assistance of UEC identify some "unique software algorithm" inside these receivers which if addressed by the data stream for Austar + Foxtel would shut them down from pay-TV service?

A SF field observer explains.

"The UEC 642 and 660 versions behave entirely differently on Austar/Foxtel. Optus made changes to the 660 universe first and then about one week later made other changes to the data-stream to stop the 642s from accessing Austar/Foxtel. The base software for each of these models is Aurora as they were intended originally to only be used with the Aurora (vertical side) service. An aside - I understand the Multichoice 660s continue to function at this stage (January 28).

"The reason why the Aurora 660 IRDs stopped working on Austar/Foxtel is because of the NIT loading sequence; they would lockup while attempting to load the 12.438H transponder. Courtesy of Internet chat room exchanges, there are at least three commonly available 'fixes' around.

"1/ Unplug the LNB cable from the IRD while the IRD is loading (or trying to load) 12.438H, plug it back in when it moves onto the next transponder in the sequence. We'll see why this *might* work, shortly.

"2/ If you are located in Western Australia, connect the 660 to a C-band dish receiving Multichoice from PAS-10 and follow on screen instructions for a "manual (software) upgrade." According to reports, that software works well with the current (January 28) Austar/Foxtel data-stream. Once loaded, return to Austar/Foxtel (where rather than Aurora, the receiver will show MULTICHOICE rather than AURORA using on-screen TV Guide function).

"3/ There is a software version for the 660 on Internet which reportedly makes it 'non-country-code-dependent'. If this is true, the 660 will when modified with this software function in Australia again.

"A fourth solution passed around involves not using the first position in the 'Signal Set-up' menu. Set that position labelled 'Signal Set-up 1 (home)' to 'Signal Source: Disabled'. Then in the second position, labelled 'Signal Set-up 2', enable a setting of 12.438H, 27.800, 3/4. This may not work in all 660s; all that happens is that instead of locking up when NIT loading the 12.438H transponder, it now locks up on the next NIT (12.638H). Some 660s contain Aurora-over-the-air loaded software updates, others do not (remember Ed G's Christmas!).

"As of this date, the Aurora authorised UEC 642s are a different story. They can still load Austar/Foxtel, but it appears Optus has told the bouquet menu to cycle on and off slowly. The 642 normally requires the bouquet menu so it will know which PIDs to put into play for each particular Austar and Foxtel channel. To the user, it appears the channel has stopped running when they briefly switch the bouquet data to 'off'.

"For this IRD, the 'start with 12.438H' solution (previous number 4) works, at least today, but it has limitations. My guess is that only the first position in the 'Signal Set-up' menu, which is labelled 'Signal Set-up 1 (home)', will load a bouquet menu. So by using the second position (disabling the first; i.e. 12.558) the channels load as a long list (rather than as a bouquet) which is exactly how a non-country -code-dependent IRD works. It will not load T11 (12.305H; Austar Interactive) which is where the bouquet menu resides. This may be why Optus now has two NITs - one of which contains *only* the T11 transponder.

"The limitation with this approach. Aurora and/or Globecast should not be added to the set-up menu. I initially thought this was OK to do, but found that it creates problems. If Aurora and/or Globecast are added (after loading the pay-TV transponders as described), it/they load onto the end of the (long) channel list. At first they seem to have been added - *until* you attempt to channel-surf.

"When the Globecast channels are viewed, and I attempt to return to the Austar/Foxtel channels, I found the first 11 TV channels (in Austar/Foxtel) have now disappeared (these were the channels on the 12.558H transponder). When the Aurora channels are selected, and I changed to the Austar/Foxtel pay-TV side, the Aurora channels briefly disappear from the channel list and then reappear in the middle of the Austar/Foxtel channels. Simultaneously, the 12.638H transponder disappears from the channel list. This suggests this particular solution works (as of January 31) provided the Aurora and probably other services are not loaded along with Austar/Foxtel."

In fact, not all 660 Aurora receivers have the same software - Optus for a period of time attempted to do overnight upgrades until users complained. So not all 660s will behave in precisely the same manner described. Remember - 642, 660 and 700 UECs are Aurora; Foxtel's 720 is not part of this "attack."

We repeat this in detail because it becomes important to recognise that whatever has been done by Optus on behalf of Austar, Foxtel and Aurora is a serious attempt to shutdown the use of certain receivers for pay-TV functions. The UEC 642 and 660 models are an obvious first choice - they total an estimated 35,000 units which until now when equipped with a "Gold Card" or Funcard" or an equivalent piracy device have played the pay-TV services without paying. Other receivers, such as the Humax series, could be a logical "next target." Was this the first major step to shutting down piracy in Australia?

Technology does not stand still

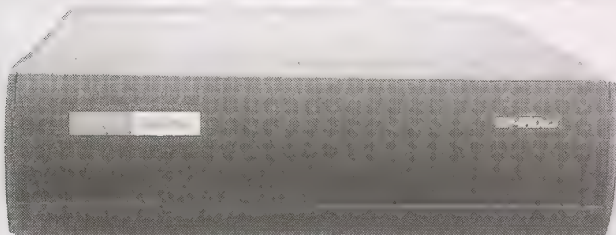
A plastic card with embedded electronic circuitry selling for under US$1 at the point-of-origin in quantity cannot be expected to withstand skilled hackers. Irdeto-One was design-flawed because it allowed a hacker to disassemble the internally embedded instructions, extract that information, manipulate the information with a home PC and then stick new, modified instructions back into that card (or countless others - called "cloning"). Within a year of the first "crack" talented software programmers were not only extracting a card's information, they were also creating their own additions - effectively blocking the card (plus IRD) from any programmer issued "turn this card off" instructions (see p. 28, "Short Course").

As long as Irdeto-One was the CA data stream, a modified card once hacked and blocked could not be "reached" by the programmer. Think of it as Mad Cow disease affecting smart cards; the only "cure" is to kill the cow/card by shutting off the entire system. Irdetro-One has been so completely breached that it as a CA format must die to save the patient.

"As you may be aware, in 2002 temporary restrictions were placed on satellite transmissions of interstate ABC programs. On occasions, the ABC is obliged to restrict cross-border television transmissions so that information provided by interstate news bulletins does not compromise court proceedings in your state. This means that during these periods you will only have access to your own state based ABC TV broadcasts. Unfortunately, because of the high volume of state-based news, current affairs and information programs on ABC local Radio and Radio National, and the technical difficulties involved in placing temporary restrictions on these radio services, the ABC has no alternative but to permanently block access to interstate ABC Local **Radio** and **Radio National** satellite transmissions. Consequently, access will be restricted to your own state broadcasts of ABC Local Radio and Radio National from 2 February. These changes will not affect your current access to other ABC radio satellite services or to SBS and commercial radio and television satellite services. The ABC expects that at some time in the future we may again have to restrict cross-border television transmissions because of State Court suppression orders. Any (such) restrictions to interstate TV programs will be temporary and will be in place for the duration of the (specified) court case only. For further information, contact ABC's Reception Advice Line on 1300 13 9994 (local call rate) during business hours."

Meanwhile hacker skills had gone into a new direction, driven by the belief that sooner or later every Irdeto-One "protected" service in the world will eventually abandon this CA format. While some hackers held out the stubborn belief that Irdeto-Two and other advanced generation card formats would eventually be "cracked," a group in Europe decided that another approach showed better long term promise.

A device called a Smart (card) Splitter appeared in the market in 1999 from a very unlikely centre for high technology; Pakistan. The splitter used an internal microprocessor to allow two or more receivers to share a single (genuine, programmer issued) card. When the card was inserted into the rather professional looking box (below), it read the card numbers and instructions and then through a plug-in board attached to the splitter allowed additional receivers to "talk" to the card for their own authorisation. There were limitations, in 1999, but the seed had been planted. For example, the Smart Splitter could not be more than 25 metres from any of the supported receivers because of something called "answer time" - how much time it took for individual system-connected IRDs to communicate with the splitter asking for "authorisation" and then to receive back an "answer." This system, in 1999, sold in

The seeds for the "next evolution" of hacking were planted in Pakistan in 1999. Using Irdeto-One as a CA format, the "Smart Splitter" allowed 3 (or more) receivers to operate simultaneously on any service.

the region of US$400 for the version that would support three IRDs from one (authorised) card (see photos, p. 21).

Dreambox (SF#107, p. 12) (1). A Linux software operated advanced state satellite receiver which includes so many "special capabilities" that one almost is forced to become (or rely upon help from) a computer "nerd" to even turn it on. Hidden in the software is a totally new system that can be historically traced back to the Smart Splitter from Pakistan.

One Dreambox is the "host" and it has a genuine programmer issued smartcard (such as the Foxtel "red") inserted into its lower "card reader" slot. A second (third, etc.) receiver connected with a local area network (piece of wire - LAN) to the host receiver then depends upon the cardserver host to provide "answers" to the additional receivers. When the additional receivers change channels (or are fired up initially), they are confronted with data stream challenges:

1/ What is the correct ECM?

2/ What is the correct EMM?

The non-card-carrying receiver uses the LAN to transfer these questions to the cardserver host. It answers the questions and goes back to the secondary additional receiver(s) with the answer - using the original genuine card as the authenticator. These answers are called "control words" or CW as abbreviated in the technology world.

Unlike earlier attempts to "share" one card amongst several receivers, there are no masterkeys or plainkeys being transmitted back and forth - communication consists only of ECM/EMM requests and CW answers. In fact, nothing involving "copyright" is being copied or shared.

It gets better for the Dreambox user. The CW is cached in a memory so approval happens in the additional box, not the host

Dreambox. More than a pretty face.

cardserver. A CW is but 0xOF bytes long (two times 8 bytes = 16 bytes) and the memory is huge by comparison (megabytes).

Now the "killer application." In fact, the host cardserver does not need to be in the same room/building as the additional non-card receivers. *Internet is the answer.* A normal dial up connection from a location with a Dreambox secondary receiver to a cardserver host allows the ECM/EMM - CW communication to take place. "Networks" of Dreambox users have been formed, some claiming 25 co-users all sharing one host Dreambox with a card. It is a technology marriage of cloning ("Three Musketeers Card: *One for all and all for one!*") and the original Pakistani developed Smart Splitter. How far apart can the host and secondary units be? Tests with a host computer in Europe, equipped with an Australian smartcard, and the additional receivers back in Australia have been flawless. Think about it - the host server does not require access to the Australian satellite. It sits virtually anyplace in the world providing ECM/EMM answers (CW) on request. Yes, this is pretty frightening and as the Modified Original Smart Card era winds down, it is the next game in town. And you can see the lawyers rubbing their hands together in glee - an entirely new level of court actions to follow!

1/ SatWorld is one regional source of Dreambox

SatFACTS Pacific/Asian MPEG-2 Digital Watch: 15 February 2004

Bird	Service	RF/IF &Polarity	# Program Channels	FEC	Msym	Receivers and Errata
Thcm3/78.5	SkyChAust	3695/1455H	up to 3	3/4	5(000)	CA (#1, 3); FTA audio #2 (dm)
	Indiavision	3685/1465H	1	3/4	6(830)	Tests June 2003; not permanent
	Korean Central	3665/1485H	1	2/3	3(367)	Global footprint; changes 02/03.
	TARBS ME mux	3640/1510H	12TV, 12 radio	2/3	28(066)	CA + 2 FTA(A1TV, IRB3)(
	Ch Nepal	3626/1524V	1	3/4	15(556)	New 03/03; FTA
	Mahar mux	3600/1550H	11TV, 1 rad	3/4	26(667)	Thai + Indian services; FTA
	SE asia Mux	3569/1581H	2+ TV	3/4	12(500)	MRTV3, MRTV (DM)
	RR Sat mux	3551/1600H	8TV,10 radio	3/4	13(333)	3TV, 5radio currently in use
	JAIN TV	3538/1612V	1TV	3/4	3(.300)	PIDs 4132/4133
	PTV1 +	3521/1629V	1TV, 1 radio	3/4	3(333)	frequency change
	TARBS	3520/1630H	12TV, 12 radio	3/4	28(.066)	Feeds to TARBS Australia and PAS-8
	TVK Cambodia	3448/1702H	1TV	1/2	6(312)	**FTA**
	TARBS/Th5	3480/1670H	12 TV+radio	2/3	26(667)	**3FTA**· TV5, VTV4, ATN Bangla
	KCTV/Korea	3424/1726H	1TV	3/4	3(.366)	Not 24 hour
	Thai Global	3425/1725V	up to 7?	2/3	27(500)	FTA (reaches SE Australia)
InSat 2E/83	**ETV mux**	4005/1145V	6+ TV	3/4	27(000)	Several ETV now here; wide beam
	Hyd Dig 2E	3910/1240V	1	3/4	5(000)	SCPC, OK E Aust wide beam
	Kairali TV	3699/1451V	1	3/4	3(.184)	SCPC, OK E Aust wide beam
	Indian mux	3643/1507V	3	3/4	19(531)	corrections 12/02
	ETV Mux#2	3485//1665V	4+TV	3/4	27(.000)	Several new ETV here; Asia beam
	Sky Bangla	3430/1720V	1TV	3/4	6(000)	New - November 2002
NSS6/95E	FreeX +	12 729V	2+ TV	7/8	27(500)	Adult, requires special CAM, no card 61-3-8795 7990
	TARBS MUX	12.699H	6+ TV	3/4	21(.000)	was 12 593Vt
As2/100.5E	**Shandong TV**	4070/1080H	1TV	3/4	6(.811)	New - October 2002
	Euro Bouqt	4000/1150H	6TV, 21r	3/4	28(125)	FTA TV + radio
	Sichuan TV	3946/1204H	1TV + radio	3/4	4(.420)	New April 2003
	Reuters News	3905/1245H	1TV	3/4	4(000)	Was 3923H; sometimes **FTA**
	WorldNet	3880/1270H	4+/28radio	1/2	20(400)	FTA; multiple audio services V2360, A2320
	Hubei/HBT	3854/1296H	1	3/4	4(418)	FTA SCPC, teletext, 2 radio
	Hunan/SRT	3847/1303H	1	3/4	4(.418)	FTA SCPC, teletext
	Guan./GDT	3840/1310H	1	3/4	4(.418)	FTA SCPC, radio APID 81
	In. Mongolia	3828/1322H	2	3/4	8(.397)	FTA: #1 Mongolian, #2 Mandarin
	APTN Asia	3799/1351H	1	3/4	5(632)	Sometimes **FTA** also 3895Vt
	Reuters/Sing.	3775/1375H	1	3/4	5(.631)	**FTA** & CA
	Liaonin/Svc2	3734/1416H	1	3/4	4(418)	FTA SCPC, radio APID 256
	Jiangx/JXT	3727/1423H	1	3/4	4(.418)	FTA SCPC, teletext, radio APID 81
	Fujian/SET	3720/1430H	1	3/4	4(418)	FTA SCPC, + radio APID 80
	QinghaiTV	3713/1437H	1	3/4	4(418)	FTA SCPC, + 2radio (APID 80)
	Henan/Main	3706/1444H	1	3/4	4(418)	FTA SCPC, + radio
	Egypt/Nilesat	3640/1510H	7+, radio	3/4	27(850)	Thru TARBS Aust, occ. **FTA**
As2/100.5E	**Macau MUX**	4148/1002V	5TV	3/4	11(850)	5 chs TV, FTA, some tests
	Feeds	4086/1064V	1	3/4	5(.632)	FTA SCPC feeds
	Dubai MUX	4020/11430V	4+, radio	3/4	27(500)	FTA , sometimes includes sport
	Jilin Sat TV	3875/1275V	1	3/4	4(.418)	FTA SCPC, + radio
	Shanghai BN	3846/1304V	1	3/4	4(.800)	V1110, A1211 + 2 radio , FTA Jan 2003
	HeiLongJian	3834/1316V	1	3/4	4(.418)	FTA SCPC
	JSTV	3827/1323V	1	3/4	4(.418)	FTA SCPC, + radio
	Anhui TV	3820/1330V	1	3/4	4(.418)	FTA SCPC + radio
	ShaanxiQQ	3813/1337V	1	3/4	4(.418)	FTA SCPC, radio APID 81
	Guan/GXTV	3806/1344V	1	3/4	4(.418)	FTA SCPC, radio APID 257
	Fashion TV	3795/1355V	1	3/4	2(626)	FTA as of May 1, 2003
	3-ch miniMUX	3752/1398V	up to 3	3/4	5(.640)	Sun-TV, Surya TV, KTV (FTA)
	Saudi TV1	3660/1490V	7+,tests	3/4	27(500)	FTA MCPC, Yemen, MBC EUROsport tests
As3S/105.5E	Telstra I-Net	12 596V	no TV	5/6	30(000)	Signal useful for dish testing - no TV
	RR Mux	3669/1481V	up to 5 TV	3/4	13(.333)	Bluekiss adult here; CA cards 61-2-9618 5777
	Zee bouquet	3700/1450V	10TV	3/4	27(.500)	Mediaguard + Conax CA; 2 occ FTA
	Ch News Asia	3706/1444H	1TV (!)	3/4	6(000)	New September 2003, English + V1160, A1120
	Arirang TV	3755/1395V	1	7/8	4(418)	FTA SCPC; New PIDs V3601, A3606 June 2003
	Now TV +	3760/1390H	up to 8TV	7/8	26(.000)	CA + NOW, B'berg, Indus Music, MTA FTA
	Star TV	3780/1370V	7(+)TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	3840/1310H	7(+) TV	7/8	26(850)	NDS CA (Pace DVS211, Zenith)
	Star TV	3860/1290V	5(+)TV	3/4	27(500)	NDS CA (Pace DVS211, Zenith)
	Star TV	3880/1270H	20(+)TV	7/8	26(.850)	NDS CA (Pace DV211, Zenith) In transition 06-2003
	Star TV	3920/1230H	4+ TV	7/8	26(.850)	Star Sports Asia (+), **FTA** NTSC, V512, A640 English
	Star TV	3940/1210V	6(+)TV	7/8	26(.850)	NDS CA as above, may NOT be operational
	CNNI	3960/1190H	8(+)TV	3/4	27(500)	PowVu CA, new SR Apr 29
	StarTV	3980/1170V	6+TV	3/4	28(.100)	NDS CA; Star News India **FTA** VPID 514, APID 648
	Star TV	4000/1150H	8(+)TV	7/8	26(.850)	NDS CA w/ **4(Chinese) FTA**
	Sahara digital	4020/1130V	8TV	3/4	27(250)	New Sr September
	Pakistani TV	4091/1059V	4TV, 1 radio	3/4	13(333)	new Sr, channels, Nov 2003
	Sun TV	4095/1055H	1	3/4	5(.554)	"History Channel" testing SCPC
	TVB Mux	4010/1040H	3	3/4	11(.230)	**MATV Chinese movies FTA**; + CA
	CCTV bqt	4129/1021H	4(+) TV	3/4	13(.240)	moved from 4115
	Zee Bqt #2	4140/1010V	8(+) TV	3/4	27(500)	Mediaguard (SECA) CA
Cak1/107.5	Indovision (S-band)	2.535, 2.565, 2.595, 2.625, 2655	33(+) TV	7/8	20(.000)	NDS CA using RCA/Thomson, Pace IRDs; **2.535 has 2 FTA**
T'Kom/108E	**IndoBqt**	3460/1690H	up to 6	3/4	28(.000)	also 3586H/17.500, 3496H/19.615
C2M/113E	**TPI**	4185/965V	1	3/4	6(.700)	FTA SCPA; NT/NC only
	TVE Asia-Africa	4160/990H	1	3/4	5(.632)	New August 2003
	Anteve	4144/1006V	1	3/4	6(.510)	change from 4055V; FTA SCPC
	Indo Mux	4080/1070H	5+ TV	7/8	28(.125)	Global TV - erratic new FEC 06/03
	Indostar	4074/1076V	1	3/4	6(.500)	FTA (new 06-03); V2201, A2202
	SCTV	4048/1102V	1	3/4	6(.618)	FTA SCPC; NT, New Caledonia only
	Indonesian Mux	4000/1250H	6+ TV	3/4	26(085)	undtable platform - not always there
	Satelindo	3935/1215H	1	3/4	6(.700)	test card - only - reported
	Bali TV	3926/1224H	1	3/4	4(208)	FTA, may not be active full time
	Indo MUX	3880/1270H	3+ TV	7/8	28(121)	FTA; Sr change 01/03; erratic

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
	GlobalMUX	3760/1390H	up to 11 TV?	7/8	28(121)	test cards (11), new Sr/FEC 01-03
	Brunei/Sing	3733/1417H	1TV	3/4	6(000)	FTA share time; Brunei 23 hrs, Sing 1 hr
	TBN/Trinity	3727/1423H	1 TV	3/4	3(000)	New PIDs 10-03; reload
	RCTI	3473/1677H	2	3/4	8(000)	FTA SCPC; Australia, New Caledonia, some English
As4/122E	**STV mux**	388101270H	8 or more	3/4	26(.850)	First TV mux to appear this new bird; erratic service
Jc3/128	Miracle Net	3996/1154V	3 up to 6	5/6	22(000)	PowerVu; some FTA (Ch. 1 & 3)
	Asian bqt	3960/1190V	up to 8	7/8	30(000)	CA & **FTA** NTSC: Japan, Taiwan
Jc2A 154	Cnet	3880/1270V	up to 12	3/4	30(000)	Cnet (Taiwan) tests; not full time
	BYU tests	3915/1245V	2	3/4	3(.703)	Erratic service; very strong NZ and Australia
MeaSs2	New Mux	12.532H	17	3/4	41(500)	New Sept 2002; unknown source
	Astro Mux	11.602H	up to 17TV	3/4	41(.500)	Aust East beam - **3 FTA** + 14 CA
	VTV MUX	11.522V	3 TV	3/4	9(766)	WA only? Skew path, intended Asia
B3/152	Optus tests	12.407V	4+ TV, 4+ radio	2/3	30(.000)	now differs from 12.407 C1; **tune ch FTA**
	Globecast tests	12.525V	8+ TV, radio	2/3	30(000)	C1 12.367V services moving here Nov-Dec 2003
	Globecast Main	12.657V	8+ TV	2/3	30(000)	Globecast "home" 1 February
	Globecast tests	12.720V	8+TV, radio	2/3	30(.000)	part of Globecast expansion underway
C1/156E	Optus testbed	12 278V/T11L	9tv, 24 radio	1/2 (*)	28(220*)	testing as of late Jan; * - may be temporary numbers
	Optus testbed	12.332T11U	9TV + radio	1/2 (*)	28(220*)	testing as of late Jan; * may be temporary numbers
	Aurora Biz	12 407V/T3	TV + radio	2/3	30(000)	NZ (90cm) + Australia
	Pay-TV	12 447V/T4	varying # TV services	3/4	27(800)	Australia NA only (leakage to Norfolk, New Cal)
	Pay-TV	12.567V/T7	varying # TV services	3/4	27(.800)	Australia NA only (leakage to Norfolk, New Cal)
	Pay-TV	12 607V/T8	varying #TV services	3/4	27(800)	Australia NA only (leakage to Norfolk, New Cal)
	Pay-TV	12 647V/T9	varying #TV services	3/4	27(800)	Australia NA only (leakage to Norfolk, New Cal)
	Austar	12 278H/T11	varying TV + data	3/4	30(000)	Australia NA; has unique NIT
	Pay-TV	12.358H/T12	varying #TV services	3/4	27(.800)	CA, subscriptions available Australia, Norfolk
	Pay-TV	12.398H/T13	varying #tv services	3/4	27(800)	CA, subscriptions available Australia, Norfolk
	Pay-TV	12.438H/T14	varying #TV services	3/4	27(.800)	CA, subscriptions available Australia, Norfolk
	Pay-TV	12 478H/T15	varying #TV services	3/4	27(800)	CA, subscriptions available Australia, Norfolk
	Pay-TV	12 518H/T16	varying #TV services	3/4	27(800)	CA, subscriptions available Australia, Norfolk
	Pay-TV	12 558H/T17	varying #TV srvices	3/4	27(800)	"Home"CA, subscription available Australia, Nrflk
	Pay-TV	12 638H/T19	varying #TV services	3/4	27(800)	CA, subscription available Australia, Norfolk
B1/160	Occ feeeds	12.380H	1 TV - *	3/4	6(.111)	* - plus 12.451H, 12.460H
	Occ. feeds	12.384V	1 TV - *	3/4	6(.111)	* - plus 12.293V, 12.402V, 12.411V
	Net 7 service	12.397H	1	3/4	7(.200)	Full schedule less commercials - links
	Net Ten	12.353H	1TV + 1 radio	3/4	5(.100)	Possibly feed to Tasmania?
	Imparja mx	12 379H	2TV + 8 radio	3/4	5(424)	PIDs vary; also try 12.360, 12.370
	7 digital feeds	12 397H	1TV	3/4	7(.200)	occ. digital feeds; typ fta
	Feeds to NZ	12 411V	1 TV	3/4	6(111)	Often NTSC, USA-Australia-NZ
	SBS Mux	12 420H	3+ TV, 2+ radio	5/6	12(600)	Also 12.420H same params; SBS HDTV + w-s
	TVNZ DTH	12 456V	5+TV	3/4	22(500)	FTA 4 channels (TVNZ x 4); +Maori, NHK here
	Nine Net	12 512H	1 TV typ	3/4	5(632)	testing digital feeds, Sr may vary
	Sky NZ	12 519/546V	7TV/7TV	3/4	22(500)	NDS CA, subscription available NZ
	Sky NZ	12 581/608V	6TV 6TV	3/4	22(500)	NDS CA, subscription available NZ
	Sky NZ	12 644/671V	9TV	3/4	22(500)	NDS CA, subscription available NZ
	ABC HDTV	12.603H	5TV	7/8	14(300)	also 12..626,.643,.670, 688, & 706H
	Sky NZ	12 707/733V	8+TV	3/4	22(500)	NDS CA, subscriptions available NZ
	Mix 106.3	12.574H	1 radio + data	3/4	1(.851)	Radio SCPC is "cover" for high speed data
P8/166	TARBS3	12 326H	13TV + radio	3/4	28(066)	TPG/EurodecMDS CA, occ. FTA
	TARBS	12 526H	13TV + radio	3/4	28(066)	TPG /Eurodec MDSCA, **1 radio FTA**
	TARBS2	12 606H	13TV + radio	3/4	28(066)	TPG/Eurodec MDS CA
	TARBS5	12.646H	testing	3/4	28(.066)	TPG/Eurodec MDS CA; **2 TV FTA**
	TARBS4	12 726H	13TV + radio	3/4	28(066)	TPG/Eurdec MDS CA
	JEDI/TVB	12 686H	11+ TV	3/4	28(126)	June 2002-Irdeto-2 CA
	ABC A-P	4180/970H	2TV, 2 radio	3/4	27(500)	Dateline west; east PAS2, 3901
	Disney Pac	4140/1010H	typ 6 TV	5/6	28(125)	PowVu CA
	NHK Joho	4060/1090H	7TV, 1 radio	3/4	26(470)	PowVu CA & **FTA**; subscription available
	FOX Mux	4040/1110V	up to 5TV	7/8	26(470)	was PAS-2, previously 3992Vt
	NET +	4121/1029V	1 TV	3/4	4(774)	NET25 + FTA; new PIDS April; reload
	ESPN USA	4020/1130H	8+TV, data	3/4	26(470)	PowVu CA; ch 11 DCP-CCP bootload; new FEC
	Discovery	3980/1170H	8 typ.	3/4	27(.690)	PowVu/CA (some audio **FTA**)
	CalBqt/Pas8	3940/1210H	up to 3+ FTA	7/8	27(.690)	PowVu CA & **FTA (EWTN +)**
	CNBC HK	3900/1250H	up to 7TV	3/4	27(500)	NDS CA (6 channels); one testcard FTA
	FilipinoMUX	3880/1270V	up to 8TV+radio	5/6	28(694)	**Myx FTA** V1960, A1920 + radio FTA
	TaiwanBqt	3860/1290H	12TV + 30 r	5/6	28(000)	Mixed **FTA & CA**; Videoland WMovie, STC
	CCTV Mux	3829/1321H	up to 4 + 1 radio	3/4	13(240)	PowVu FTA, replaces PAS-2 svc
	TVBS-N	3836/1314V	**1FTA**, 4+ CA	3/4	22(.000)	Difficult because of CCTV cross pole
	EMTV PNG	3808/1342V	1 + 2 radio	3/4	5(632)	was As2; PowVu CA
	CNNI	3780/1370H	3, up to 5 TV	3/4	25(000)	PowerVu
	Discovery Asia	3764/1386V	Up to 6 TV	3/4	19(850)	PowerVu; Asian MUX; new parameters Nov '03
	MTV	3740/1410H	8	2/3	27(.500)	# 8 **MTV China FTA V289, A290;** rest CA
	ABS-CBN APT	3712/1438V	1	3/4	3(.712)	24/7 English track 2 news, V4096, A4099 11-03
P2/169E	Off-shore rigs	12.281V	2+ TV, radio	2/3	27(500)	PowVu CA, WIN, ABC NT
	WA PowVu	12 637(5)V	4TV, 8 radio	1/2	18(500)	PowVu CA, WA only - D9234
	NBN-TV	4126/1024V	1TV	3/4	3(075)	3m up (NZ), 1.8m up Australia
	TARBS	4090V/1060V	9TV + radio	3/4	21(.000)	Occ FTA (Chile +); BIG power reduction Nov.
	Feeds	4037/1113H	1+ TV	2/3	6(.620)	Sporting feeds (occassional)
	Feeds	4027/1123H	1+TV	2/3	6(620)	Sporting feeds from USA (occassional)
	Feeds	4023/1127V	1 +TV	3/4	13(.328)	feeds to (USA) pay-TV
	Feeds	3966/1184V	1	2/3	6(.620)	PowVu (FTA) occ feeds
	Feeds	3957/1193V	1	2/3	6(.620)	PowVu (FTA) occ. feeds
	Feeds	3929/1221V	1	3/4	10(.850)	PowVu (FTA) occ sport feeds
	Feeds	3912/1238V	1	2/3	6(.620)	PowVu(FTA) occ. feeds
	Feeds	3898/1252V	1	2/3	12(.000)	PowVu (FTA) occ. feeds
	Middle East	3836/1314V	4 typ	3/4	13(.331)	**Irdeto 2 CA - subscriptions avail; Strong Tech**
	Feeds	3803/1347V	1	3/4	6(.000)	PowVu (FTA) occ sport feeds
	PAS/**BBC** mux	3744/1406V	3	3/4	21(.500)	**BBC, test card FTA,** others nominally CA

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
(PAS2/169E)	**Adventists.tv**	4040/1010H	1	2/3	5(.900)	New December 2003, 24/7 "Hope Chs."
	Feeds	3868/1182H	1	2/3	6(.620)	FTA (occ sport); also try 3863,Sr6 100
	Feeds	3939/1211H	2 (typ NTSC)	2/3	6(.620)/7(.498)	FTA-typ NTSC-occ sport, live Shuttle
	Cal PowVu	3901/1249H	up to 8	3/4	30(.800)	PowVu CA + **FTA** (BBC gone)
	HK bouquet	3850/1300H	up to 8	2/3	24(900)	was 4148Vt; some **FTA**
	occ feeds	3776/1374H	1 typ	3/4	5(560)	occ feeds, typ FTA; also Sr 5 600
	Korean Bqt	3771/1379H	1	3/4	9(.041)	Korean MUX, reload 02/03
I804/176E	**iPSTAR**	12.619H	1	2/3	25(.220)	Tests, late May start, also 12.646H
	Tests-NZ beam	12.646H	1	3/4	22(.418)	Testing possible data links; June 2003
	RFO Poly	4027/1123R	1TV	3/4	4(.566)	SE spot beam, was 4027LHC
I701/180E	TNTV	11.060&11.514	9	3/4	30(.000)	east spot; 10TV + r each, vertical pol.
	Canal+Sat	11 610H	16TV, 1 radio	3/4	30(.000)	1+ **FTA**, MediaGd "2"; + 10.975 weaker
	TVNZ	4195/955RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	TVNZ/BBC	4186/964RHC	1	3/4	5(.632)	DMV/NTL early vers. occ feds, typ ca
	TVNZ	4178/972RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	AFRTS DTS	4175/975L	3 TV, 3 radio	2/3	3(680)	DTS Direct to Sailors, audio previously FTA - no more
	TVNZ Aptn	4170/980RHC	1	3/4	5(632)	DMV/NTL early vers. occ feds, typ ca
	TVNZ/feeds	4161'989RHC	1	3/4	5(632)	DMV/NTL early vers., occ feds, typ ca
	RFO-Canal+	4086/1064L	4TV, radio	5/6	12(.041))	east hemi 20.5 dBw +; new Sr
	TVNZ/feeds	4052/1098RHC	1	3/4	5(632)	DMV/NTL early vers.,occ feeds, typ ca
	TVNZ feeds	4044/1106R	1	3/4	5(632)	SCPC, mixed CA and **FTA** feeds
	NZ Prime TV	4024/1126L	1	2/3	6(.876)	PowVu CA; Auckland net feeds
	NBC to 7 Oz	3960/1190R	1	7/8	6(447)	CA, Leitch encoded
	WorldNet	3886/1264R	1TV, 37 radio	3/4	25(000)	New PIDs Dec 03 very strong NZ, Pacific
	Ioarana	3772/1378L	1	3/4	4(.566)	FTA SCPC, East Hemi Beam-Tahiti
	TVNZ	3846/1304R	1	3/4	5(.632)	SCPC, mixed CA & **FTA**, feeds
	NBA (Barker) Ch	3803/1347R	1	3/4	6(.111)	NBA feeds - probably CA - new Nov 2003
	10 Australia	37691381R	4	7/8	20(.000)	PowVu CA & **TBN-JCTV FTA**
	USA feeds	3749/1401R	4?	?	26(400)	16-QAM (not MPEG-2 compatible)

MPEG-2 DVB Receivers: (Data here believed accurate; we assume no responsibility for correctness!)

Aston Simba 201. Embedded SECA (Zee, Canal +); review SF#97. MediaStar 61-2-9618-5777.
AV-COMM R3100. FTA, excellent sensitivity (review SF May 1998); new version Sept. '99. Av-COMM P/L, 61-2-9939-4377.
AV-COMM R3100(A). FTA, good sensitivity, ease of use exc (review SF May 2002). See above contact.
Benjamin DB6600-CI. FTA, Foxtel/Austar w/CAM+card. Autosat Pty Ltd 61-2-9642-0266 (review SF#72)
Coship 3188C. Review SF#107. Blind search FTA rcvr. Presently available from Satlink NZ www.satlinknz.co.nz. "In our humble OPINION, " If this is such a great receiver, why is it not handled by more distributors??? (see page 28, here)
eMTech eM-100B (FTA), eM-200B (FTA + Ctx2), eM210B (FTA + 2xCI + positioner); KanSat 61-7-5484 6246 (review SF#89)
Humax F1-CI. Primarily sold for TRT(Australia), does (limited) PowerVu (not Optus Aurora approved).
Humax ICRI 5400 (Z). Embedded Irdeto + 2 CAM slots; initial units had NTSC glitch, now fixed. Widely available, SF#76.
Humax IRCI 5410 (Z). Adaptable version capable of holding multi-CA systems (SF#98, 99). Widely available.
Hyundai-TV/COM. HSS100B/G (Pacific), HSS-100C (China) FTA. Different software versions; 2.26/2.27 good performers, 3.11 and those with Nokia tuners also good; later 5.0 not good. SATECH (V2.26)
Hyundai HSS700. FTA, PowerVu, SCPC/MCPC. Review SF March 1999. Kristal Electronics, 61-7-4788-8902.
Hyundai HSS800CI. FTA, Irdeto (with CAM) + other CA systems, PowerVu, NTSC. Kristal Electronics, above; review SF#63/
INNOVIA IDS3088. Review SF#111. Blind search FTA receiver. High quality IRD; no known source in Pacific but apparently available in Singapore.
ID Digital CI-24 Sensor. New August 2003; new lower noise tuner, extra sensitivity; CI interface slot Irdeto 1 & 2; review SF#109. Sciteq 61-8-9409-6677.
MediaStar D7. FTA, preloaded w/ known services, exc. software (review SF July 1998). MediaStar Comm. 61-2-9618-5777
MediaStar D7.5. New (May 00) single chip FTA; review June 00 SF. MediaStar Comm. Int. 61-2-9618-5777
MediaStar D10. FTA and Irdeto embedded CA. VG receiver; see review SF#96, August 2002. Contacts immediately above.
MultiChoice (UEC) 660. Essentially same as Australian 660, not grey market contrary to reports. Sciteq tel 61-8-9306-3738
Nokia "d-box" (V1.7X). European, FTA, may only be German language, capable of Dr. Overflow software. SF#95, p. 14.
Nokia 9200/9500. When equipped with proper software, does Aurora, pay-TV services provided software has been "patched" with "Sandra" or similar program. See SF#95, p. 14, SF#96 p. 15. SatWorld 61-3-9773-9270 (www.satworld.com.au)
Pace DGT400. Originally Galaxy (Now Foxtel+Austar). Irdeto, some FTA with difficulty (Foxtel Australia 1300-360818). UECs replacing; Sept 18 (2003) "drop-dead" day; all were to have been "turned off" on that date (in fact, those with V1.13 CAMs may still be working).
Pace DVR500. Original DGT400 modified for NBC (PAS-2)/RSA use, with CAM equivalent to DGT400 but more reliable.
Pace "Worldbox" (DSR-620 in NZ). Non-DVB compliant NDS CA including Sky NZ, no FTA; similar "Zenith" version.
Panasat 520/630/635. MCPC FTA, Irdeto capable, forerunner UEC 642, 660. Out of production, spares fax ++27-31-593-370. No longer wotrk with Austar/Foxtel.
Panasonic TU-DS10. FTA + Irdeto CA; one of 2 IRDs approved by Optus for Aurora, but never available in Australia.
Phoenix 111, 222. PowVu capable, NTSC, graphics, ease of use. (111 review SF#57). SATECH (below)- 222; terminated
Phoenix 333. FTA SCPC, MCPC, analogue + dish mover. Detailed SF review SF#51. SATECH 61-3-9553-3399.
Pioneer TS4. Mediaguard CA (no FTA), embedded Msym, FEC, only for Canal+Satellite (AntenneCal ++687-43.81.56)
PowerVu (D9223, 9225, 9234). Non-DVB compliant MPEG-2 unless loaded with software through ESPN Boot Loader (see below). Primarily sold for proprietary CA (NHK, GWN+ PAS-2 Ku, CMT etc). For service only - callScientific Atlanta 61-2-9452-3388. For revision model D9850, see Scientific Atlanta (below).
PowTek. Blind Search Chinese sourced, field tests rate it highly. Source jason@adigitalife.com
Prosat 2102S. FTA SCPC/MCPC, NTSC/PAL, SCART + RCA. Sciteq 61-8-9306-3738.
SatCruiser DSR-101. FTA SCPC/MCPC, PowVu, NTSC/PAL. (Skyvision Australia 61-3-9888-7491, Telsat 64-6-356-2749)
SatCruiser DSR-201P. FTA SCPC/MCPC, PowVu, NTSC/PAL, analogue, positioner - (Skyvision - see above).
SATWORK ST3618. Blind search FTA receiver. Fast search, problems, especially in "memory-filing" system; review SF#111. Available DMSi at tim@dmsiusa.com.
SATWORK ST3688. Blind search, 3000 ch memory, multi-format RF modulatoi; improved version 3618. Review SF#113; available DMSi (above).
Scientific Atlanta D9223, D9225; Orig. PowerVu, superceded Dec 2003 by D9850. Commercial receiver, available TVO 61-2-9281-4481, John Martin
Strong Technologies SRT2620. SCPC, MCPC FTA, exc sensitivity, ease use, programming. Review SF#91 (ph. below).
Strong SRT 4600. SCPC, MCPC, PowerVu; exc graphics, ease of use, review SF#64. Strong Technologies 61-3-8795-7990.
Strong 4800. SCPC, MCPC, embedded Irdeto+ CAM slots, Aurora. Strong Technologies 61-3-8795-7990.
Strong 4800 II. SCPC, MCPC CAM slots x 2 for Aurora +, Zee, Canal +. Strong Technologies (above); review SF#103.
Strong 4890. SCPC, MCPC, 30Gb PVR, 2 CAM slots, DiSEqC 1.0, 1.2 (review SF#84); Strong Technologies, # above.
UEC Atlas/Titan. New July 2003, replacing DGT400 for Austar. No SCART, L-band loop; also available Rural Electronics 61-2-6361 3636.
UEC642. Designed for Aurora (Irdeto), approved by Optus; w/new software, C-band FTA; faultyP/S. Norsat 61-8-9451-8300.
UEC660. Upgraded UEC642, used by Sky Racing Aust., Foxtel-limited FTA. (Nationwide - 61-7-3252-2947); P/S problems.
UEC700/720. Single chip Irdeto built-in design for Foxtel; unfriendly for FTA. Power supply problems, seldom sold to consumers; propensity to fall off back of trucks.
Winersat DigiBox 200. C + Ku basic receiver but includes Teletext for NZ TVOne, 2 VBI. Satlink NZ, fax 64-9-814-9447

Accessories:

Aurora smart cards. MYCRYPT (Irdeto V2) cards now available (Oct. 2003), Sciteq 61-8-9409-6677.
PowerVu Software Upgrade: PAS-8, 4020/1130Hz, Sr 26.470, 3/4; pgm ch 11 and follow instructions (do not leave early!)

WITH THE OBSERVERS

AT PRESS DEADLINE

Express-AM22 flight one has been launched to 53E and testing should be underway when you receive this. AM22 has four more satellites scheduled for launch (locations not yet identified) before end of 2005. "CELEBRITY" (Globecast 12.525V B3) carrying British feeds at high data rate (7.266 MBit/s), test card.

AsiaSat 2/100.5E: "Guangxi Radio, 3806V, Sr 4.418, 3/4 now on right hand channel." **(DL**, NSW) "East Radio Shanghai replaces Radio Shanghai TG News, 4106Vt, FTA, APID 1213." **(TK)**

AsiaSat 3/105.5E: "Now have excellent stock of 2.5 Viaccess cards for Bluekiss adult service (3669V, Sr 13.333, 3/4). Requires a Viaccess CAM to work -older 1.07 versions will not work. Some Allcams (but not all) work provided the card is inserted into a licensed Viaccess box first." **(Jacob**, at MediaStar, NSW).

I701/180E: "We have made some changes to our channel PID structure - no future changes are planned at this time. For those without Scientific Atlanta IRDs: IOR program stream (virtually channel 90 on SA IRDs): Video PID is 2460, Audio PID #1 is 2420, Audio PID #2 is 2422. On AsiaSat 2 stream, SA virtual is channel 100, for others it is VPID 2360, APID #1 2320, APID #2 2322." **(George C**, gcantalu@ibb.govb)

MeaSat 2/148E: "Astro Box Office Sports now on 11.168Vt, CA; VPID 172, APID 128." **(FS)**

NSS 6/95E: "Promos: SEXZ TV 12.729Vt, Sr 27.500, 7/8, using 2.398 Mbit/s while FREEX TV (which I describe as backroom-gay rubbish) has a data rate of 3.006 Mbit/s; VPID 833 & 834, APID 1281 & 1281, PCR 1537 & 1538." (BR, NSW) "The TARBS World TV MUX moved from 12.593Vt to 12.699Hz, Sr 21.000, 3/4 on Australia beam (29 Jan; Black and White) "Changes in channel line-up on 12.688Hz; Playlist Italia replacing Video Italia amongst others." **(Stoney)**

Optus B1/160E: "Maori TV promotion and NHK World refed from PAS-8 has joined TVNZ TVOne and TV2 twin channel services 12.456V." **(S. Jepson**, NZ)

Optus B3/152E: "Sigram is now into regular full-time transmissions on 12.525Vt, CA, VPID 1160, APID 1120." **(PD**, NSW) ""Austrasian retail Radio Network 3 & 4 plus Australian Sport 927 are now on 12.407Vt, APID 259, 260 and 272 in Irdeto-One." **(DS**, NSW) Note" Also see updates p. 31, here.

Optus C1/156E: See updates starting p. 29, here.

Palapa C2/ 113E: "3747H and 3765H, Sr 5.632, 3/4 VPID 308, A256, SID2 - Asialink test cards." **(B. Richards**, Aust.)

PanAmSat PAS8/166E: "New services come (and go) on 3860Hz; latest is Pila TV (VPID 470, APID 471; CA." **(NK)**

Soapbox: :"In SF#113, you are suggesting that Impact TV with 4 x 36 MHz transponders might create 36 program channels (9 per 36 MHz). In fact, each 36 MHz could handle at least 15 programming channels - subject to content. Sky's 1/2 transponders average 7 video channels each and Saturn when on B1 was running 12 channels per 27 MHz." **(CS**, NZ) (Editor's note: True about Sky but they are 27 MHz bandwidth not 18 [which is half of 36]. It all comes down to how much you want to cram into megahertz of bandwidth versus delivering something people rave about the quality. Heck's bells - the Internet system we reported in December and January manages a full motion TV signal in 384 kbps which if translated to a 36 MHz wide transponder would be 94 [!] TV channels per 36 MHz. Let us hope it never comes to that.) "The hype and promotion for Foxtel digital is well and truly underway in Australia. In one commercial appearing on terrestrial TV, there are three name-recognised but hardly high quality comedians debating why they might like to 'upgrade' to Foxtel digital. At the end there is a tag line - 'How does Foxtel do this?' as if it were some sort of very advanced technology. Through a window one sees an individual being handed something very suspicious by aliens from another planet. That someone is an amazing look-alike for Rupert Murdoch and the 'insider message' is that Ruppie had some help from interplanetary visitors to create the new digital service. With his Dr Spock ears, I found it difficult to decide *who* was the alien!" **(VG**, Qld) (Editor's note: For a first hand impression, read our "Programming" notes on p. 2.) "I worry that people selling the Bluekiss Adult Channel cards may be heading for legal problems - remember, please, that this level of adult-porn is only 'legal' in Canberra and NT. My personal impressions after struggling through an hour of it is the production qualities are low-grade, the video quality is often not good, and there is

Ethnic TV resource. SBS (Aurora package, 12.407Vt C1, Sr 30.000, 2/3 on Aust-NZ beam) is rich in imported TV programming from Europe, Asia (www.sbs.com.au); Spain's TVE shown.

WITH THE OBSERVERS: Reports of new programmers, changes in established programming sources are encouraged from readers throughout the Pacific and Asian regions. Information shared here is an important tool in our ever expanding satellite TV universe. Photos of yourself, your equipment or off-air photos taken from your TV screen are welcomed. TV screen photos: If PAL or SECAM, set camera to f3.5-f5 at 1/15th second with ASA 100 film; for NTSC, change shutter speed to 1/30th. Use no flash, set camera on tripod or hold steady. Alternately submit any VHS speed, format reception directly to SatFACTS and we will photograph for you. Deadline for March15th issue: March 3 by mail or 5PM NZST March5th if by fax to 64-9-406-1083 or Email skyking@clear.net.nz.

Clarifying some Nokia DVB2000 Observations

The questions relating to "which" version Nokia receiver will properly execute German-bred DVB2000 remains a much discussed topic. Our thanks to DM in NSW for the following Internet exchanges.

"All of the early DVB programs had a problem with audio. I better expand that a bit - no version, not one, of DVB2000, has been capable of producing audio on my Nokia 9500, to date. Hence my curiosity to see if there is a 9500 out there with the 4920 chipset producing audio on the 9500?"

Answer: "Found this hidden away in the read.me file for DVB2kBeta8: 'DO 05/24/2001, Version 1.84.6 microcode fixes the OLD CS 4920 audio DSP. So there seems to be a fair indication that the 4920 chipset is a problem."

Response: "I bought a similar Nokia a few years back for a cheap price thinking I was getting a bargain. No matter what I did software wise the 4920 audio chip would simply not work with the DVB2000. I ended up just using it for logging purposes as I never liked the original Nokia software. This is definitely a hardware problem but perhaps only with certain versions of the Nokia 9500S; not all by any means, just some."

Conversion price? You might be surprised to learn ...

"Funcards cannot be used with software CAMs that operate with 'normal' smartcards. For example, a Humax receiver with factory software CAM cannot be used with a Funcard, but can function with modified software. Goldcards can be programmed to behave as Funcards, so that they will work with a modified software CAM Humax; but, then that Goldcard will not work in a normal IRD like a UEC. Perhaps someone has written software for the UEC to make them work with Funcards, but if that has been done, there would be very few of those IRDs." Bottom line? A IRD once modified to work with Funcards (or some Goldcards) may never work with a pay-TV (or Aurora) issued card unless returned to its original software state.

no plot line - just constant sex and largely between women at that." (**LS**, Victoria) (Editor's note: On the other hand, if you operated an "adult motel" and wanted to attract customers, piping it into your rooms would probably significantly increase your customer base! And significantly increase what it cost you to 'clean up' a room after guests left.) "I recently was asked to come up with a mobile-in-motion satellite TV reception system for a client who wanted to have his (NZ) Sky TV go with him, live, in his camper van while on the road. It is not an impossible task although given the abruptness of New Zealand terrain coverage will never be universal. A low profile dome on the roof of your vehicle uses phased arrays (inside); take a look at www.kvh.com as one acceptable example. I was especially impressed with the 'basic RSV' model, TracVision S3. Stop at the end of the day, turn on the TV set, and it will automatically lock onto the satellite you have chosen. Less than US$2,000." (**Nigel Clough**, NZ). "aDigitaLife.com now represents the American built super feeds from Seavey. Information upon request." (61 7 55 295683)." (Jason Radic) "We have never ever had such a reliable receiver (as the Coship line); only 2 faulty units in over 1,000 sales! Also note our power supplies do not radiate, no-one except Waipu Cable TV (SF#113) has ever complained about this." (Satellite Man, Auckland) (Editor's note: OK - how many readers have had a Coship failure of ANY kind? How many have noticed radio interference from the SMPS power supply? Let us hear from you!) "Kerry Packer's run on the Australian horse racing rights is apparently tied to a belief that with the launch of Foxtel digital (on cable -it is already available on satellite) off-line betting will increase dramatically, creating new revenue for the folks who own the racing venue telecast rights." (**AI**, Victoria) "My PowTek blind search IRD, with which I am very pleased, is a photocopy of the Innovia receiver interior photo which was published in SatFACTS #112 (p. 18). But the price was 'right' and am very pleased with blind search performance." (**DM**, NSW) "I have had a bad experience with a Mr. Jajat whom I reached through Babylon Communications. Apparently my dish system had a motor problem and I had lost all reception. He took the motor with him and proceeded to fix my dish to one satellite with s steel bar. Alas, after an hour reception quit. Ultimately I found the motor I had allowed him to take away was perhaps not broken after all and I requested it be returned. Adding to my woes, he returned a different motor which was truly broken. I then took the matter to the local police along with his bill for $558." (Letter significantly edited by SatFACTS) (**H. Dekock**, Mt Roskill, Auckland). (Editor's note: In every business activity there are those who will take advantage of the consumer if the opportunity arises. Unfortunately, a consumer who knows absolutely nothing about satellite TV and depends upon the installer to be "straight" is expecting a great deal. Nothing in this letter convinces us the installer (Babylon) did anything illegal but in the end it becomes a "civil" not a criminal matter unless you are able to prove beyond doubt that the motor drive returned to you was not the one the installer took away for repair.) "I found an article in TVB Europe which addressed the matter of WIN Media 9 (WM9) as a logical successor to today's satellite delivered medium to high bandwidth services. I quote: 'The key issue is can WM9 really do better at half the bit-rate that you require with MPEG-2. The obvious place where WM9 is going to be useful is within the ADSL/DSL networks. The telcos really want to get into video delivery, but they do not have the channel capacity to carry it in quantity. What they have demonstrated is good quality TV pictures at, maybe, as low as 1 MBit/s. The primary focus of the broadcasters is to adopt a wired (Internet) format which will deliver customer friendly images (and sound) using the narrowest bandwidth practical. One application, in Europe, is where OFDM (Editor's note: "COFDM" is a narrow bandwidth system and there WM9 could be a valuable asset in the broadcasting world.") (**IF**, Qld.) (Editor's note: Expect much increased 'debate' about whether highly compressed digital video, as a variant of

Quotations: From Australia's ABC-TV coverage of the Foxtel "digital initiative"

Concerning "churn" (18% of Foxtel subscribers leave the service each year):

Prior subscriber: "We used three channels regularly. We'd flick through the others (47 total) and it sounded appealing to have these extra channels. But we found we were just doing a lot of channel surfing and that became annoying to us as a family. Other than the sport and Arena, we found the movies nothing to get excited about."

Paul Budde, Telecommunications analyst: "Digital is not going to make the difference. It is about price: If your basic price is not around $15 to $25 a month, people are not going to take up the Basic Service and by not doing so will not be in a position to 'move up' to he litany of other services Foxtel plans to introduce."

Prospective customer: "I think movies on demand means you don't have to get into your car and drive to a video or DVD store. It is the modern way of doing it and middle term possibly the end of video stores being in the recent film rental business."

Prior subscriber (as above): "I don't think digital alone will convince us to rejoin."

Paul Budde (again): "Price is the key issue. If Foxtel does not address that one, we are not going to see any improvement in pay television."

Foxtel rep: "Our product is not an expensive product. It is less than one cup of cappuccino a day. Our research shows that price is not an issue that comes up in our research."

Comment: How many of the non-subscribers can identify with purchasing a "cup of cappuccino" each day? This is a terribly "elitist" mindset that totally fails to identify with the typical non-subscriber. How about "two bottles of beer?"

MPEG-2 or the newer MPEG-4, will be 'satisfactory' for broadcast use, in the future. As SF has reported [#112 and #113], rates as low as 384 kbps will produce video quality that rivals SCPC satellite transmissions and actually exceed the pixel rates of satellite services such as Fashion TV. Logic suggests narrow bandwidth highly compressed video will improve in viewing quality and ultimately 384 kbps will be viewing-identical to 4 Mbit/s. MPEG, a format, is still early days.) "Compare pricing to Australia: Echostar/Dish TV DTH Network. 86cm (34") direct view monitor + receiver, Dish HDTV/SDTV satellite receiver, dish + LNB and cables or substitute 40" (1016cm) rear screen projected receiver (both 16:9) for US$999 (A$1307). Come on Foxtel - get a handle on what people want!" (**DH**, NSW) "What are the advantages, if any, to the much advertised 0.3 dB noise figure Ku LNBf products?" (Kelly, NSW) (Ed's note: Tests coming soon!)

The Optus C1 Month

Continuing our observations of rapid-fire changes in the transponders of C1 and B3; in SF#113, the last update entry was through 7 January.

8 January: T14/12.438H, 27.800, 3/4 channel labelled 'FBOB' now airing FTA tape loop, demonstrating how to use Foxtel's new IRD to access the FBO movie channels. This channel was FTA this date only; an instruction booklet in the tape was clearly marked with the PACE logo. The IRD and remote were drawings only leading to presumption this is the NDS format IRD which Foxtel may yet bring to Australia. The tape ended with 'Copyright Foxtel 2004'. Note the FBOB channel was not part of any subscriber bouquet so it could not have been accessed by a subscriber - consider it an 'in-house' display for employees. On January 9th, FBOB went CA .

10 January: T4/12.447H, 27.800, 3/4. Optus rebroadcast normal Foxtel sport channels (i.e. FS1, FS2, FFC) FTA labelled as SPA, SPW, SPH, FTA.

12 January: T1/12.305V centre frequency. Optus began experimenting with different symbol rates, FECs, power levels on this 72 MHz Tr.

14 January: Big changes this day. Pay-TV NIT became a pair of NITs, totalling 14 transponders. The first 13 transponders (below) use Sr of 27.800, FEC 3/4.

1/ T17/ 12.558H, Transponder (TP) ID: 1
2/ T12/ 12.358H, TP ID: 2
3/ T15/ 12.478H, TP ID: 3
4/ T13/ 12.398H, TP ID: 4
5/ T14/ 12.598H, TP ID: 5
6/ T20/ 12.688H, TP ID: 7
7/ T7/ 12.567V, TP ID: 8
8/ T8/ 12.607V, TP ID: 9
9/ T9/ 12.647V, TP ID: 10
10/ T16/ 12.518H, TP ID: 15
11/ T4/ 12.447V, TP ID: 16
12/ T14/ 12.438H, TP ID: 17
13/ T19/ 12.638H, TP ID: 18

The second NIT contained only the Austar Interactive transponder with Sr 30.000, FEC 3/4.

14/ T11/ 12.278H, TP ID: 19

Of the 14 transponders (as of this date), T11 and T17 carry multiple versions of Irdeto while the other 12 have NDS and multiple versions of Irdeto. Clue: By the method used at Optus to identify transponder ID numbers, it now appears there will ultimately be as many as 19 pay-TV MCPCs on Optus C1 (note: A 72 MHz width transponder such as T1 can - and will - carry two MCPC packages in the single transponder.)

The two transponders added to pay-TV on this date (14 January) appear to be NDS plus more than one version of Irdeto. A transponder that has NDS, Irdeto-One and Two on its data stream can include a *channel* which is simulcrypt only in Iredeto-One and Two, another channel that is only NDS, and so-on (other combinations). Thus on a channel by channel basis, Irdeto-One may not be in use. The new ones are:

T16/ 12.518H, 27.800, 3/4 with ten active programme channels and one no-PID channel. As of this date, the content was "TV1 +2', 'Show + 2', 'Channel 121' (Comedy Channel), 'UKTV + 2, 'Arena + 2', 'Fox Classics + 2', 'Mov1 + 2', 'Fox 8 + 2', 'Life + 2', 'Channel 645' (History). The "+2" indicates the programming is for Western Australia, delayed by two hours from Eastern Australia.

T20/ 12.688H, 27.800, 3/4 with 10 programming channels as follows: '642' (Biography Ch), '122' (E!), '118' (9 net archived programming), '508' (extreme sports), '809' (VH1), '116' (wine and foods), '704' (Fox kids), '646' (NGEO format), '648' (TechTV), '640' (travel), '708' (children's channel).

15 January: T1/12.305V centre frequency now has two distinct MCPCs. T1Lower: 12.287V, Sr 28.220 (note unique number), 1/2 (and note unique FEC). T1Upper: 12.322V, 28.220, 1/2. On this date there was no PAT nor NIT; signal levels lower than Globecast T2 but with available power spread into two MCPC signals, 'backoff' would be required.

Also on this date Austar's interactive MCPC changed to 12.305H (still 30.000, 3/4) from 12.278H - possibly to avoid cross pole problems with the new T1 vertical signals now testing.

23 January: T1Lower 12.287V, 28.220, 1/2 now has a NIT and a working PAT which loads a number of ABC channels. This MCPC is using the same Network ID number as Aurora (labelled 'Aurora Testbed' when received on UEC642); both Irdeto-One and Irdeto-Two are here - as with normal Aurora transponders. Channels loading this date on T1Lower

were: (TV) 1/ABC TV WA, 2/ not in use-NIU, 3/ NIU, 4/ NIU, 5/ ABC TV SE, 6/ ABC TV SA, 7/ ABC TV WA, 8/ NIU, 9/ ABC TV NT (all TV 4:3, subtitles page 801 of the teletext; no EPGs as of this date). (Radio) 1/ ABC FM WA, 2/ ABC RN WA, 3/ ABC RR WA, 4/ ABC RR WS, 5/ ABC FM NT, 6/ ABC RN NT, 7/ ABC RR NT, 8/ ABC FM SA, 9/ ABC RN SA, 10/ ABC RR SA, 11/ ABC FM Q, 12/ ABC RN Q, 13/ ABC RR Q, 14/ ABC RR NQ, 15/ ABC FM SE, 16/ ABC RN SE, 17/ ABC RR SE, 18/ ABC RR V, 19/ ABC JJJ, 20/ ABC PNN, 21/ NIU, 22/ NIU, 23/ NIU, 24/ NIU.

T1Upper as of this date had no NIT or PAT.

T11/ 12.278H, 30.000, 3/4 on "Ch 2" (which was previously Ch98, being instructions for replacing PACE receivers) has new EPG ("Smartcard Expiry Notification") airing a loop including graphics shown p. 20 (this issue). As of this date, this does not load into any bouquet.

T14/ 12.438H, 27.800, 3/4. "FBOP" remains FTA but SKYM (Sky Mosaic) is now CA. And CA channel "CCV" now has an EPG advising: "Digital Help. Select this channel for a practical demonstration of Foxtel Digital covering the Digital Programme Guide and Personal Planner and introduction to multi-camera sports, news on-demand, the latest movies and games. Running time is approximately ten minutes."

27 January: T1Upper, 12.332V, 28.220, 1/2 now has the same NIT as T1Lower, is labelled "Aurora Testbed", same two versions of Irdeto as normal Aurora transponders, and a PAT. The CA channels play with a normal Aurora card. (TV) 1/ IMP (Imparja), 2/Info 31 (on original Aurora - still running - this channel goes CA when it is rebroadcasting AsiaSat 3's Star Sports; here it plays with Aurora card), 3/ NIU, 4/ NIU, 5/ WLK (not running), 6/ NIU, 7/ NIU, 8/ NIU, 9/ SBS QLD (not running), 10/ NIU, 11/ Seven Central (actually, not as labelled; is Ten Tasmania digital in widescreen - same as TAS TV feed on Optus B1). (Radio) 1/ RABS Tone (no PIDs), 2/ 990AM (no PIDS), 3/ CAMMA (CA), 4/ Teabba (CA), 5/ 5PY (CA), 6/ 2CUZ (CA), 7/ PAKAM (CA), 8/ PAW (CA), 9/ Arrow One (FTA), 10/ 8HA (CA), 11/ Mulba (CA), 12/ BIDJARA (CA), 13/ NIU, 14/ NIU, 15/ TAIMA (FTA - on original Aurora, does not play with an Aurora card), 16/ SBS R Q (no PIDs), 17/ NIU, 18/ NIU.

28 January: All "SPI Dummy" channels removed. T19/12.638H, 27.800, 3/4 channels labelled MOV1 and MTV (which were copies) removed from loading table; two radio channels (r19, r20) moved to the first PAT to replace these two TV channels. It appears the maximum number of channels in a PAT for the NDS CA being tested might be 26.

29 January: The UEC 642, on this day only, loaded the pay-TV bouquets "normally." The bouquet menu (which remains two menus combined) now has more bouquets. This was the full list: 1/Austar Test, 2/ Test 2, 3/ Austar, 4/ Austar NSW, 5/ Austar Vic, 6/ Austar Qld, 7/ Austar SA, 8/ FSWAP, 9/ Foxtel NSW, 10/ Foxtel Vic, 11/ Foxtel Qld, 12/ Foxtel SA, 13/ Foxtel WA. Multiple Austar bouquets are to deal with Footy and other (regional) sports coverage they are obtaining from Foxtel.

30 January: T1Lower and T1Upper still running but the NITs, PATs and all channels have been removed.

T11/12.305H, 30.000, 3/4 (Austar's moved interactive transponder). Extra channels added to the two PATs (a Nokia loads 44 total here as of this date). The extra channels (not necessarily with the true loading positions) are: 1/ ABC (ABC SE 16:9, FTA with a hidden teletext PID of 1076 containing subtitles on page 801), 2/ SBS (SBS SE 16:9, FTA, with a hidden teletext PID of 1086 containing subtitles), 3/ EXPO (FTA but a test card), 4/ Games (GAMES is another channel, has audio and data PIDs, but not in use), 5/ Mind (has PIDs, NIU), 6/ Arcd (no PIDs), 7/ Ludi (no PIDs). Note: ABC, SBS and EXPO are still on T19/12.638H and are only used by Austar (not Foxtel); perhaps they are moving to T11. The new Austar bouquets do not contain EXPO, which might explain why Optus is not bothering to move it. Further: As T11 is on a separate NIT, does not contain NDS (CA data stream), and is running at a symbol rate that is not compatible with NDS IRDs, this transponder will possibly be used exclusively for Austar-only channels. If true, if is unlikely Foxtel will be using the ABC and SBS (16:9) TV channels now here.

1 February: T2/12.367V. Globecast, true to intentions announced last November, shut down this transponder today (replacement is B3, 12.657V). Three more programme channels are now widescreen: T17/12.558H, 27.800, 3/4 - UKTV, T15/12.478H, 27.800, 3/4 - MAIN (which rebroadcasts Fashion TV most of the day), and, T15/12.478H, 27.800, 3/4 - MAINC. (Note: Reason this channel exists is unclear - not currently on Austar or Foxtel bouquets, parallels MAIN until 10:45PM nightly, then when MAIN switches to adult, it transmits a static "Main Event" logo. Other widescreen services as of this date (all currently Irdeto-One): ABC, SBS, FOX8 (2 channels - Foxtel and Austar versions), W, and 4 FFC (Fox Footy channels).

The Optus B3 Month

10 January: T5/ 12.525V, 30.000, 2/3. Until this date, "Al Manar" continued to load with its original PIDs (V1760, A1720, PCR 1760 and code 85 = 1731). The service was shut down December 22 after attracting significant adverse publicity because terrorism supportive content. On this day (10 January) the Video and PCR PIDs changed to 2081 and the code 85 entry disappeared from the PMT. Then Al Manar was reactivated (although the UEC 642 and some other receivers have difficulty playing it, glitching badly).

15 January: The seven Sky TV (Australia) TV channels on Aurora Business transponder (12.407V, 30.000, 2/3) are no longer Irdeto Version-One. This now appears to be a variant of Irdeto (i.e.: not Two either) not in use back on Optus C1. The other CA TV and radio channels on this transponder remain Irdeto-One., including Optus Business Channel BTV3. Sky (Australia) uses BTV3 for "special events" from time to time. There is no NDS encryption on this transponder.

23 January: T5/12.525V, 30.000, 2/3, Globecast. Sigram Tamil TV is now Irdeto-Two CA. Al Manar continues to operate but the PIDs have changed once again: V1760, A1720, PCR 1760.

28 January: T3/12.407V, 30.000, 2/3 (Aurora Business Transponder). Radio channel number 5, previously "Austral Asia" and CA has a new label of:" A-A R1, Radio Akashwani - The Voice of India www.austral-asiacommunications.com." As of this date, FTA but a very low data rate (0.049 MBit/s) and there is no audio.

31 January: T5/12.525V, 30.000, 2/3 (Globecast). Additional TV channel added, labelled, "CELEBRITY," with (decimal format) PIDs of V=308, A=256, PCR = 308. These are typical PIDs used for international feeds and they do not fall into the same family of PIDs used by other channels on this transponder.

1 February: With the shutdown this date of C1 12.367V (Globecast), the new "home" for this packaged transponder is now officially 12.657V (Sr 30.000, 2/3).

T12/12.407V, 30.000, 2/3 (Aurora Business) - new radio channel labelled "A-A R1, Radio Akashwani-The voice of India" is now broadcasting in (an) Indian language, FTA. Data rate remains at 0.049 MBit/s in mono. With the exception of "SPORT 927" (0.073 MBit/s), other radio channels here are also running at 0.049 MBit/s.